THE PHILOSOPHY OF LIFE & HEALTH, AND THE TREATMENT OF DISEASE

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THE WHY AND THE WHEREFORE;

OR,

THE PHILOSOPHY

OF

LIFE, HEALTH, AND DISEASE:

NEW AND ORIGINAL VIEWS

EXPLANATORY OF

THEIR NATURE, CAUSES, AND CONNEXION;

AND OF

THE TREATMENT OF DISEASE UPON A FEW GENERAL PRINCIPLES, BASED UPON THE LAWS OF NATURE AND COMMON SENSE: WITH RULES FOR THE PRESERVATION OF HEALTH AND RENOVATION OF THE SYSTEM.

THE FRUIT OF THIRTY YEARS' OBSERVATION AND PROFESSIONAL EXPERIENCE.

BY

CHARLES SEARLE, M.D., M.R.C.S.E.,

AND LATE OF THE E. I. C. MADRAS ESTABLISHMENT.

"A cripple on the right road will sooner reach the distance-post than a racer on the wrong."—SWIFT.

LONDON:

JOHN CHURCHILL, PRINCES STREET, SOHO.

EDINBURGH: MACLACHLAN AND CO.

DUBLIN: FRANCIS AND CO.

MDCCCXLVI.

LONDON:
C. J. PALMER, PRINTER, SAVOY-STREET, STRAND

PREFACE.

A KNOWLEDGE of life and health, or how we move, and think, and have our being—how we may enjoy health and escape disease—would appear of all others that which best deserves our acquirement; yet, strange to say, it is the description of knowledge the most, if not the only one, at the present day, neglected.

This, then, is the subject of the following Treatise; and I shall endeavour, with as much brevity as it will admit of, but without omitting anything essential to its elucidation, to present the reader with a complete system of the science and practice of Medicine, and of the philosophy of life and health. At first sight this would appear to be an extensive subject; but I trust that, by a methodical arrangement, and the establishment of a few simple principles in the beginning, I have fully embraced the subject within the moderate limits of this single volume.

Every disease, it is obvious, consists, intrinsically or virtually, in the derangement of health; and health, it must be equally apparent, is but the normal or natural condition of life. To comprehend disease, therefore, a knowledge of life is an indispensable pre-requisite. To the want of this

knowledge—the foundation-stone of all just reasoning upon disease—it is, that the science of Medicine is in its present very imperfect state, and that so much discrepancy of opinion exists, even among the best-informed members of the profession, giving rise to such publications as the "Fallacies of the Faculty," and other conflicting theories; to say nothing of the incongruous doctrines of the Homœopathist, the Hydropathist, and the Animal Magnetiser.

If I mistake not, I have, in this work, made it appear, (the laws of Nature being in all cases simple, when known,) that all diseases are allied in character, and consist in a few abnormal conditions of the vessels of nutrition and of the blood's circulation; and that the derangements of these vessels constitute the disease essentially, whatever its kind, and wherever it may be located. And if so, that the treatment of all may be embraced in a few general principles—definite in kind, though doubtless modified in degree, by the constitution and age of the individual, and the particular circumstances of the case; and that the remedies also are accordingly and proportionately few in number.

Being of opinion that the principles of the subject are within the comprehension of every intelligent person, and that a distinct knowledge of the principles of any subject is essential to its successful practice; and seeing the lamentable ignorance that exists in these matters, and the charlatanism which prevails, I have been induced to address myself to the public, rather than to the profession, not from any disrespect to its members—far otherwise, for a more enlightened body, and liberal-spirited class of men, no

where exists—but with the view of laying open to the public the delusions of incompetent pretenders, and of imparting that amount of knowledge which every individual ought to possess, on a subject of such pre-eminently personal importance, and especially so as regards the causes and prevention of disease, and of those calamities we see daily recorded in the public journals—such as persons falling down dead in the streets, or dying by some sudden attack after a few hours or days of illness—calamities which, I am confident, judicious precaution would, with scarcely an exception, have prevented;—disease, with very few exceptions, being progressive and accumulative in the system; the enemy giving ample time, while in possession of the outworks, for guarding the citadel within, and thus averting, and in general by very simple means when early resorted to, the more formidable attack.

Nor is there anything in the character of disease itself, in the ordinary forms of its visitation, which renders it either difficult of comprehension, or necessarily so fatal as daily experience so lamentably exhibits it. Nature, in man's construction, has not put her work out of hand so fragile and incomplete, as to require on our part anything more than a knowledge of her laws, attention to her admonitions, and the exercise of common prudence, to preserve us in health.

But this knowledge is not possessed, and the people are led to believe that the subject is beyond their comprehension. The system based upon chartered rights, and exclusiveness, which has grown up amongst us—the profundity of the doctor's reserve—his gold-headed cane—guinea fee,

copious pharmaeopœia and Latin proscription,* (the essential bases of Parr's pills and the host of vaunted specifics of the quack,) have sunk the public mind in the profoundest abyss of darkness and ignorance upon these subjects—which, be it observed, concern man's best possession—life and health!

In the construction of this work I have endeavoured, by a consecutive train of reasoning, to lead the reader, under the guidance of the laws of Nature, and the intuition of common sense, from effects to their causes, and contrariwise from causes to effects, to form his own deductions, and to arrive, I hope, at just conclusions; in the same manner as my own opinions have been formed—with this difference only between us, that I have been directed on my course and in the composition of this work, by the light emanating from more than thirty years of observation and study of the subject in all its bearings, and the actual practice of it as well during the same period.

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* Chartered rights but too commonly mean—corporate monopolies—privilege without duty! The College of Physicians should be the conservators of the public health; they should report annually to Parliament the condition and statistics of public health, explain the causes of disease, point out their remedy, and direct the public as to the best means of their prevention. Instead of fulfilling such purposes, the public have become so mystified by the profundity of the Doctor's degree and Latin prescription, that they have been driven from his shrine into the hands of the quack, and swallow by wholesale Morison's pills for the preservation of their health; instead of its having been taught them, that moderation in diet, abstinence from spirituous beverage, the avoidance of perturbation of mind, the observance of cleanliness, pure air, exercise, and a comfortable feeling of warmth, are alone the essential elements of health, and that its preservation therefore is at all times in their own keeping!

That the work, in despite of my best endeavours to render it deserving acceptance with the public, will nevertheless be open to objection of some kind, I am fully prepared to expect. No two of us think alike upon any subject. In enunciating new principles or views of any kind, therefore, however correct they may appear to the author—whose mind is stored with the facts upon which they are based—it is not to be expected of those wanting this knowledge, that they will immediately see them in the same light, and at once acquiesce in their validity. But as I have done my best to educe the truth in all cases, I have no fear of the result, although a little time may be required to determine the value of those views, and their correctness in all essential particulars.

The style of the work, I am conscious, is open to objection, but I am not to be deterred by any feeling of insufficiency of authorship in this respect, from submitting to publication the substance of what it is my sincere conviction embodies the *germ*, if in reality it bears not the perfect fruit, of much good. In the execution of this task—and a task it has really proved to me, my health having sadly suffered by the application of the mind which was indispensable on the occasion—I can most conscientiously aver, a sense of public duty has alone influenced and supported me.

Whether I have been right or wrong in allowing such a motive to actuate me, time alone can determine. For better or for worse, such as it is, I cast forth the work freely upon the waters of public opinion—hoping nothing, and fearing nothing from its decision. A screw may be *loose*, or perhaps

many may be thought to be so, but none, I hope, will be discovered absolutely out of place ; or, in plain terms, some unsatisfactory reasoning may have been addueed, but nothing, I trust, has been said, that is not in principle substantially eorreet: all that I solieit on the oeeasion I have a right to expeet—fair play and no favour! The bats and the sharks will doubtless attaek me; and briek-bats and mire I am fully prepared to expeet will be showered at me; but to these I am invulnerable. Candid eritieism, and well-authenticated faets, I respeetfully invite; but to attaeks of interested malevolenee, or inapprehensive ignoranee, I am, in the support of my own bosom, supremely indifferent.

Bath, 5, *Upper East Hayes*,
June, 1846.

CONTENTS.

PREFACE, page iii.; INTRODUCTION, page xv.

[The figures refer to the numbers of the paragraphs.]

CHAPTER I. *Page* 1.

LIFE, ITS NATURE, SOURCE, AND PRODUCTION; AND OF THE TEMPERATURE OF THE ANIMAL BODY.

Life, animal or physical, in contradistinction to spiritual, 1. Vegetable life, 2. Chemical action the cause of life, 3. Incubation of the egg, 4. Animal life, 5. The principle of life —motive or nervous power, 6. Vital temperature, 7. Electro-nervous power, 8. Electricity developed by combustion, and in the galvanic trough, 9, *and note.* Organic life, 10. Animal life dependent on organic, 11. Capillary action the primary attribute of life, 12, 13. Disease —its essential constituents 14. Elements of Health, 15.

CHAPTER II. *Page* 9.

THE NATURE AND FUNCTIONS OF THE VARIOUS ORGANS OF THE BODY.

Classification of organs, 16. Stomach, description of it, 17, 18. Peritoneum, 19. Intestines or bowels, 21. Digestive and subsidiary processes, 22. Gastric juice, 23. Chyle, 24, 25. The lungs, 26. Their functions, 27. The heart and its functions, 28. Absorption, 29. The blood's perfection and circulation, 30. The absorbent vessels, 32. The lacteals, 33. Venous absorption, 34. Beautiful conservative provision, 35. Purifying organs, 36. The kidneys, 37. The liver, its structure, function, and connexions, 38, 39, 40. The pancreas, 41. The spleen, 42. The skin, its numerous and important functions, 43, 44; associated with the lungs, 45, 46. Elec-

tricity the excitant of all the functions, 47. Connexion between body and mind, 48. The brain and nervous system, 49. The sympathetic nerves, 50. The source of the brain's electrical power, 51. Excito-motary functions, 52. The brain's functions, 53. Death, 54. Resuscitation, 55. Harmony and design, 56. Fund of electro-nervous power, 57. The brain divisible into parts, and their functions, 58. Sleep, dreams, &c., 59. Conditions of life, 60. Health and spirits, why affected by atmospheric influence, 61.

CHAPTER III. *Page* 34.

OPERATION AND INFLUENCE OF AIR, TEMPERATURE, DIET, BEVERAGE, EXERCISE, SLEEP, AND MENTAL EMOTIONS, IN MAINTAINING HEALTH AND PRODUCING DISEASE.

The air, its composition and purity, 63—65. Nitrogen, its use, 66. Ventilation, 68. Impurities, 69. Malaria, its nature, 70; its effects, 71. Impure air prolific of disease, 72. Nature of air or gas, 73. Combustion, 74. Life and heat developed by air, 75; how maintained, 76. Hibernation of animals, and frogs entombed, 77, *and note.* Climate and season, 78. Effects of heat and of cold, 79—81. Humidity of atmosphere, 82; its rawness, 83; its pressure, and effects of low barometer, 84, 85. Salubrity of air, 86; its electrical condition, 87. Effects of various winds, 88, 89. Soil and solar influence, 90. Blood, its elements whence derived, 91. Nutrition, combustion, vitalization, 92, 93. Elements of animal substance, 94. Blood's purification, 95. Vegetation, 96. Man omnivorous, 97. Rule of diet, 98; its quantity and quality, 99, 100. Nutritive qualities of animal food, 101. The characteristic element of flesh—nitrogen—whence derived, 102. Water man's proper beverage, 103. Spirituous beverages, their nature and influence, 104. Exercise, 105. Sleep and waking, 106. Mental exercise and influence of moral causes, 107. Joyousness of youth, 108. The brain and stomach's antagonism, 109. Influence of education and moral causes on the system, 110. Excess of mental excitement, 112.

CHAPTER IV. *Page* 77.

PREFATORY OBSERVATIONS ON DISEASE.—CONGESTION, IRRITATION OR INFLAMMATION THE PRIMORDIAL CONDITION OR ESSENCE OF ALL DISEASE; WITH AN EXPLANATION OF THEIR NATURE, CAUSES, AND CONNEXION.

Disease, its character, 114. Congestion, its nature and causes, 115. Inflammation, its nature and cause, 116. Irritation, its nature and

cause, 117. Irritation a condition of the vascular and not of the nervous system, 118.

CHAPTER V. *Page* 82.

ON THE OPERATION AND INFLUENCE OF BLOODLETTING AND MERCURIALS IN THE TREATMENT OF DISEASE.

Bloodletting, 119; in congestion, &c., 120, 121. Review of the heart's function, 122; in inflammation, 123. Stimulants, 124. Mercurials—Calomel in the cure of disease, 125. Operation of all remedies, 126. Mercurials increase capillary excitement, 127. Indications which mercury fulfils, 128. Calomel, its effects with reference to quantity, 129; its great and peculiar value, 130.

CHAPTER VI. *Page* 91.

ON DYSPEPSIA AND NERVOUS DERANGEMENT.

Causes of dyspepsia, its symptoms, and treatment, 132—135. Reciprocal influence of body and mind, 136. Nervous derangement, 136. Complications and treatment, 137. Remedy for mental anxiety, 138.

CHAPTER VII. *Page* 97.

ON DISEASES OF THE BRAIN AND NERVOUS SYSTEM, AND THEIR CONSEQUENCES—APOPLEXY, PALSY, INSANITY, DISEASES OF THE HEART, &C.

Diseases resulting from excessive mental excitement, 140. Disease of the heart, 141. Apoplexy and palsy, 142. Apoplexy of the fat and plethoric, 143, 144. The attack of palsy, 145. Premonitions of apoplexy, 146. Treatment of apoplexy and palsy, 147; modified by circumstances, 148, 149. Nervous irritation, spasm, &c., 150. Insanity, 151;—treatment, 152. Inflammation of brain, 153. Brain fever—see observations in Introduction. Cases of excited intellect and mental delusion, 154. Essential character of insanity, 155. Determination of blood to the head, and cases, 155—158;—treatment, 159, and see Introduction. Hereditary tendency to insanity, 160. Case simply and successfully treated, 161. Bloodletting, 162. Moral treatment, exercise, &c., 163. Preventive measures, 164.

CHAPTER VIII. *Page* 123.

OF THE DISORDERS AND DISEASES OF THE STOMACH, BOWELS, LIVER, AND KIDNEYS, AND THEIR CONSEQUENCES, GOUT, SCIATICA, PILES, AND SOME AFFECTIONS OF THE SKIN, BLADDER, WOMB, &c.

The stomach, its disorders, 166. Indigestion and its effects, 167.

Congestion of the stomach and of the liver associated, 168. Torpor and derangement of the liver, 170. Frequency of liver complaints, 171. Circulation of blood in the liver, a new explanation of, 171, *note*. Treatment of indigestion in its various forms, 172—174. Piles, fistula, and diseases of the bladder and womb, 175; —treatment, 176. Diarrhœa and its treatment, 177. Cholera, 178. Treatment of diarrhœa, 179. Chronic diarrhœa, 180. Treatment of cholera, 181. Fever succeeding diarrhœa, 182. Inflammation of the bowels, and treatment, 184. Importance of active measures in the treatment of acute inflammation, 185. Discrimination of symptoms and treatment, 186, 187. Treatment of inflammation of the spleen, bladder, kidneys, &c., 188. Effects of extreme excitement, 189. Treatment of inflammation of stomach, bowels, and bladder, 190, 191. Gravel and calculi, 192. Gout, rheumatism, and sciatica, and cutaneous affections, their cause, 193, 194. Albumenaria and congestion of the kidneys, 195. Inflammation and treatment of these affections, 196, 197. Treatment of gout, 198—201. Sciatica, tic doloureux, &c., causes and treatment, 202, 203. Cutaneous affections, treatment of, and remarks, 204, 205.

CHAPTER IX. *Page* 150.

OF LIVER DISEASE AND CERTAIN ASSOCIATED AFFECTIONS OF THE LIVER, STOMACH, AND BOWELS—CONSTITUTING CHOLERA MORBUS AND DYSENTERY.

Congestion of the liver, its protective influence, 206, 207. Causes of liver complaint, 208. Estimate of the reduction of the heart's power by extreme heat, 208, *note*. Symptoms of torpor and congestion of the liver, 209. Bilious fever, 210. Chlorotic female, 211. Torpor of liver in more advanced life of females, 212. Inflammation and induration of liver, 213. Abscess, and sequelæ, 214. Dysentery, 215, 216; sequelæ, 217. Bilious purging and cholera morbus, 218—220. Malaria, as a cause of dysentery and liver disease, 221. Treatment of congestion of the liver, 222; of bilious fever, 223. Further remarks on liver affections, 224. Treatment of bilious purging, 225. Melæna, 226. Treatment of cholera morbus, 227 — 230. Treatment of inflammation of the liver, acute and chronic, 231 — 233. Treatment of dysentery, acute and chronic, 234 — 238. Dysentery with remittent fever, 239. Inflammation of peritoneum and treatment, 240, 241. Dropsy of abdomen, 242.

CHAPTER X. *Page* 175.

ON THE DISORDERS AND DISEASES OF THE RESPIRATORY ORGANS AND CIRCULATING SYSTEM, OR AFFECTIONS OF THE LUNGS, SKIN, WINDPIPE, AND AIR-PASSAGES—INDUCING COUGHS, COLDS, RHEUMATISM, CONSUMPTION, ASTHMA, AND FEVER.

Skin and lungs united in office and disease, 243, 244. Lungs' protection, 245. Effects of cold upon the lungs and air-passages, 246, 247. Inflammation developed by cold, 248. Effects on the eye, 249. Cough, cold, sore-throat, pleurisy, and inflammation of the lungs, 250. Principles of treatment, 251. Fever, its development and symptoms, 252, 253, 255. Reaction from cold, 254, 255. Fever, cause of its frequency, 257, 258. Treatment of simple fever, 259, 260. Rheumatism, sciatica, &c., developed by cold, 261. Treatment of inflammation of the lungs and air-passages, and pleurisy, 262—267; of cough, 268; of sore-throat, 269. Relaxed uvula, 270. Catarrh, 271. Influenza, its causes and treatment, 272—274. Pulmonary consumption, its nature and treatment, 275—277. Its probable cause, 278, 279. Asthma, its causes, character, and treatment, 280.

CHAPTER XI. *Page* 203.

FEVER IN ALL ITS FORMS; INFLAMMATORY AND TYPHOIDAL—CONSTITUTING BILIOUS FEVER, AGUE OR INTERMITTENT FEVER, SCARLATINA, RHEUMATIC FEVER, ERYSIPELAS, CONGESTIVE FEVER, &c.

Character of fever, 286. Distinction, inflammatory and typhoidal, 287—289. Inflammation, superadded to fever, 290. Malarious fever, 291. Hæmorrhagic reaction, 292, 293. General indications in treatment of fever, 294, 295. Modifying causes, 296. Causes of typhoidal fevers, 297. Special indications of treatment, 298. Use of opium, 299. Treatment of bilious fever, 300; of congestive and remittent, 301; of intermittent, &c., 302. Influence of bark and quinine, 303. Observations on scarlatina, &c., 304, 305. Causes of complications and perplexity in fever, 306. Quinine in acute rheumatism, scarlatina and erysipelas, 307—314.

SUPPLEMENT. *Page* 222.

GENERAL RULES FOR THE PRESERVATION OF HEALTH AND FOR THE RENOVATION OF THE SYSTEM.

Laws of nature and common sense our guide, 315, 316. Purity of air, 317. Clothing and temperature, 318. Cold ablution, 319. Advice to those of costive habit, 320. Importance of the skin's function to health, 321. Exposure to cold, 322. Rules of diet, 323. Moderation defined, 325. Time of meals, 326, 327. Dinner, 328. Tea and after-meals, 329. Breakfast, 330. Requirements of the delicate, 331. Objectionable viands, 332. Beverage, 333. Water, 334. Tea and Coffee, 335. Exercise, active and passive, 336 — 338. Exercise, its influence, and want of, 339. Time of exercise, out-door, &c., 340, 341. Mental employ, 342. Sleep and repose, 343. Sleeplessness, 344. Mesmerism, 345—347. Sleeplessness and anxiety, remedy for, 348. Nightmare and bad dreams, 349. Wakefulness, 350.

RENOVATION AND INVIGORATION.

Renovation, 351. Examination of organs, 352. Bleeding and evacuation curative efforts, 353. Slight disorders deserving attention, 354. Premonitions of disease, 355 ; of apoplexy, 356. Objections to bloodletting answered, 357. Life often lost by neglect, 358. Heart diseases, 359. New-formed blood the pabulum of life, 361. Simple constitution of the blood, 362. Nitrogen, characteristic element of flesh and blood, 363. Purity of blood, 364. Causes of decrepitude and disease, 365. Renovating influence of bloodletting, 366. Bloodletting not unnatural, 367. Facts in proof, 368, 369. Renovating influence of air, exercise, &c., 370. Principles and practice of hydropathy, 371. Its use in gout and rheumatism, 372. In dyspepsia and general debility, 373. System of training, 374. System of Preissnitz not limited to the use of cold water, 375 ; commendation, 376 ; may be practised at home, 377. Cold water as a beverage, 378. Concluding remarks on medicine, and a general domestic remedy, 379.

INTRODUCTORY ANALYSIS.

As all disease consists in the derangement of health, and as health imports nothing more than the normal condition of life, in a treatise on the philosophy of health and disease, life necessarily becomes the object of our primary attention. And accordingly the nature, source, and production of life in the system, are the first points considered in the following pages.

Life, and the warm temperature of the body which accompanies it, are derived at birth from the parent; but are afterwards maintained by the agency of the air respired and received into the blood and entering into combination or chemical union with elements of the blood which are derived from the food and beverage and obtained from the stomach; —this union of the oxygen of the air with certain of the elements of the blood being attended with an evolution of heat, (the cause of the body's temperature,) and of *electricity*—the motive power or actuating principle of life,* of which we have

* Upon this subject I must be permitted to solicit the reader's particular attention in this place, inasmuch as in the body of the work I have neglected to adduce the facts and afford the evidence which I ought, in proof that *electricity* is the motive actuating principle of life, or nervous power of the

immediate evidence in the action it imparts to the capillary vessels—or those intermediately situated between the arteries and the veins, and composing the principal substance of the organs, and constituting the vessels not only of nutrition and secretion, but primarily of the blood's circulation also. The first action of life visible by the microscope in the incubation of the egg, is the blood's circulation through these vessels (before any heart is to be seen); and the last to be discovered after the apparent death of an animal, is this circulation also, and which continues for some hours. The action of these vessels, by which nutrition of the system is accomplished and the blood is circulated, (aided by the heart after birth,) is excited by the *electricity* evolved from the blood they contain.

I may here be permitted briefly to observe, that the blood is the pabulum of life: it not only affords nutrition to all

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animal system, This, I may first observe, was the opinion of Hunter, Sir H. Davy, and Abernethy, and is that also of Sir John Herschell, Mr. Faraday, and many able physiologists of the present day, both English and foreign; although it is derided by some others. Some men with their eyes open cannot see, and there are others again who I believe *will* not! The facts, however—let them speak for themselves. That the actions of life are dependent on the breathing process, hanging, drowning, or suffocation however induced, testify to be correct: and that these actions of life, like the light afforded by the candle, are dependent upon the air imbibed by the animal in respiration, and upon oxygen one of its constituents in particular, abundance of experiments establish the truth of also. Now, in the case of the candle, both light and heat are manifested; and these are the products of combustion —or, in other words, the chemical union of oxygen with carbon and hydrogen — the constituent elements of the tallow or wax, and forming by their union carbonic acid and water, and evolving both light and heat in the process; the correctness of which all are willing to acknowledge. The same combination takes place in the animal system, between some of the elements of the blood—consisting in like manner of carbon and hydrogen, with oxygen inspired into it also; and this combination is attended with the same products as are developed by the candle, of carbonic acid and water,

the system, but it is the essential source also of warmth and vitality to all its parts. These nutritive and vital processes of the blood are effected in the organic vessels—or those extremely small vessels which from their hair like size are called capillary, and constitute the principal substance of all the organs and parts of the body. The heart and the powers of the blood's circulation are all subsidiary to these fundamental processes of life, all the other purposes of the circulation being subordinate and essential to that of bringing the blood, enriched with the food it has imbibed from the stomach and the air it has imbibed from the lungs, to these vessels, that they may fulfil these nutritive and vitalizing processes of organic life. The powers of the blood's circulation consist of the heart, which by its contraction propels the blood from its cavity through the vessels, in connexion with it, called arteries; and which again by its

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and of heat—by which the temperature of the body is maintained. And as the experiments of Pouillet and Read (adduced in the first chapter of this treatise) establish the fact, that this chemical combination of carbon and hydrogen with oxygen in the first case (that of the candle) is further attended with the evolution or development of electricity, it ought likewise, and must, take place in the second, or within the animal system!

This, then, I believe to be the source of the electro-nervous power. But I may be asked to prove this hypothesis; which I acknowledge I cannot do in the positive way, the subject not being susceptible of direct experiment; but I will bring forward such an amount of presumptive evidence, and so many facts in support of it, that I shall be sadly disappointed indeed if they do not bring home conviction to every mind, and justify me in assuming it to be a fact beyond question—that electricity and the nervous power are identical! We have first the fact, that certain animals generate it and are armed with it as a weapon: the electrical eel, the torpedo, and the silurus may be mentioned. From an example of the first, (a living eel recently exhibited in the Adelaide Gallery,) I have upon several occasions received an electric shock; and from the same animal Professor Faraday has both fired gunpowder and decomposed water, leaving no question that animals have the power to produce electricity. Now when we consider this fact is coupled with another—that its electric apparatus

dilatation or expansion draws the blood back into it again through another set of vessels called veins;—the blood being aided in its circulation by the motion imparted to it by the action of the capillary vessels—or those, I repeat, intermediately situate between the arteries and the veins, and in which vital action first manifests itself, and to the maintenance of which—the organic life—all the actions of the system and functions of the organs composing it, are essentially subservient, are dependent on, or conducive to.

The functions of the several organs composing the body and subservient to life, are accordingly the objects which next receive attention;—first, those of digestion and assimilation, or such as are concerned in the reception into the system of the food and beverage, and their conversion into blood;—secondly, those of the blood's aëration or vitaliza-

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is furnished with nerves, of extraordinary magnitude when compared with those of any other part of its system, and that these nerves are associated in common with the rest of its nerves, being part and parcel of the same, and connected with the brain in common with the rest, as the power-directing organ—and we see a corresponding structure of brain and nerves in all other animals, wanting alone the especial supplementary apparatus, which these all possess, for concentrating and imparting the electricity by shock,—I say, when we see these animals differ in no other particular of their organization, and are supported in their existence like all others, by the agency of the air and the ordinary descriptions of nutriment, we ask ourselves why they should differ in this one particular, of being so armed? The answer is furnished by the fact that in the case of man and other animals in possession of limbs, the electric power can be so much more conveniently and efficiently employed by the contraction of muscles giving motion to their bony limbs, by which a blow or kick is inflicted, or a bite by the motion of the jaw is effected, that no such supplementary apparatus is required! The power, it will be observed, in both cases is the same, but is differently exercised; the nerves, too, being its conductors in both cases. but in the latter case exercised through muscular action, in like manner precisely as it is evident the muscles of the electric animal are excited for its progression and ordinary action—that is, by electricity—the medium of im-

tion, and of its distribution or circulation;—thirdly, those of the blood's purification. And this is followed by a description of the brain and nervous system; and all the varied phenomena which they exhibit are severally investigated, and the connexion existing between the mind and the body explained.

The maintenance of life and of health by the operation and agency of air, food, beverage, warmth, sleep, and exercise, is then investigated; and lastly, these several agents and influences on the system and mental emotions, in the production of disease, are explained.

After thus investigating the phenomena of life and health, and establishing the fact, that health consists in, or is essentially connected with, a due action of the capillary vessels—or life as it first manifests itself in the organic structure—we perceive or deduce the fact, that all disease, or derangements

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parting it being nerves, which in both cases proceed from, or are connected with, the brain, and in the electric animal are also associated with those of the electric organ. The source of this power, or electricity, generated in the system of both descriptions of animals, is the same, — the oxygen of the air entering into chemical union with the carbon and other constituents of the food, and united in the blood; and conducted, as evolved in the capillary system, (wherein the final changes in the blood's composition take place,) to the brain—the general depository of the system, — by which its mental and other functions are excited, and from which it is transmitted, at the pleasure of the animal's volition, by the nerves of conduction to the muscles by which the animal moves, or inflicts a blow; and in the electric animal it is concentrated in the electric organ for this purpose—by which a shock is imparted. The analogy is complete in every particular, and is thus further illustrated; in like manner as the oxygen of the acid and water enters into combination with one of the metals of the galvanic combination (in the ordinary apparatus) and develops electricity, which the other metal collects, and the wires in connexion transmit, (as in the electric telegraph or in those of the electrician's battery which convey his mandates,) and is thus employed as a chemical agent to decompose water, fire gunpowder, or impart shocks at his discretion. The nerves

of health, consist intrinsically and virtually in the disorder or derangement of this, the primary organic action—that is to say, that of the capillary vessels and the functions they fulfil. And as we next show the disorder and derangement of these vessels to consist in a condition of *congestion*, or passive fulness; or of *irritation*, or preternatural excitement; or of *inflammation*, or extreme excitement,—we determine and assume that one or other of these conditions of the capillary or organic vessels is the primordial condition or essence of every disease;—that all disease is therefore intrinsically and essentially of the vascular system;—that one or other of the conditions above mentioned, and which run into each other by insensible gradations, constitutes the disease virtually wherever it may be located;—and that all the various forms in which disease manifests itself, are but the localization of this the essential disease, modified in

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or fibrous cords of animals fulfil precisely the same purposes as the electrician's wires. In support of these views I may further add a few of the facts elicited by the experiments of Matteucci, (to whom the Royal Society lately awarded the Copley medal). In summing up the results derived from his experiments, he observes:—"The electrical current is altogether independent of the brain and nervous system (as a source of this power); and the circumstances which exercise a marked influence upon its intensity are respiration and the sanguineous circulation. Sulphuretted hydrogen has a marked influence in diminishing the intensity of this current; its intensity varies according to the temperature in which the animal [he was experimenting upon a frog] has lived a certain time, it cannot be raised without occasioning an increase of activity in this current. The intensity increases in proportion to the rank the animal occupies in the scale of being, [rabbits and pigeons were experimented upon], while the duration of the current after the death of the animal is in an exactly inverse ratio. Experience has shown me, that in proportion to the elevation of the temperature in the frogs originally, so much the sooner the effect of the want of nutrition was manifest." Food, I may here add, being as essential as respiration to the development of the electrical current. He subsequently adds, "The chemical actions of nutrition evolve electricity." In conclusion, if it be admitted that

character by the nature or structure and function of the part in which it is centralized, and combinations founded upon the derangements which successively ensue.

Now, should this be true, (and the sequel, in the explanation afforded of the phenomena of all the principal diseases of the body, I am of opinion, most irrefragably proves it to be,) the treatment of every disease is of necessity brought within the confines of a *few general principles*, definite in kind, although doubtless modified in degree, by the constitution of the individual, his age, and the particular circumstances of the case; and in thus simplifying the subject, we take a step in advance of the present complicated system of medicine—a step assuredly of the utmost importance.

If the treatment of all disease may be thus embraced in a few leading principles, our remedies are necessarily reduced proportionably in number also. And as the princi-

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electricity is evolved by the chemical actions going on in the animal system—which the evidence adduced and Matteucci's experiments pretty satisfactorily prove—and that electricity is equal to fulfil all the purposes of the nervous power—which numerous experiments establish also to be the case—and that living muscular fibre is the most sensitive of all electroscopes—and that there is an electric discharge in all muscles at the moment of their contraction, as Matteucci has shown,—I would ask whether it be at all probable that Nature, with her universal economy of means, would provide any second agency to fulfil the requirements of what this one alone is quite equal to accomplish? which second power, moreover, exists only in imagination—there being not a shadow of evidence to prove its existence. And as the "vital force" of Liebig, (using his own words) "unites in its manifestations all the peculiarities of chemical forces, and of the not less [mind this] wonderful cause which we regard as the *ultimate origin* of electrical phenomena," I may, with the facts adduced, venture to call it by its proper name, and at once affirm it to be what it really is—*Electricity*.

In explanation of the phenomena of Electricity in the animal system, and of its source and production being derived as above explained, I read a paper to the Westminster Medical Society, in 1830; which paper was published in the pages of the *Lancet* of the 4th of June of that year.

pal and most important remedies in the treatment of these affections of the capillaries, appear to consist in calomel and bloodletting, I have next treated of those remedies; explaining the indications they fulfil, their operation, and the influence they possess, and the necessity for caution in having recourse to them. And in reference to bloodletting, (on which subject much prejudice at present exists,) I have in the Supplement, when treating of renovation of the system, endeavoured to make it appear that, judiciously employed, it is a much more harmless practice than is generally supposed; —that Nature often directs us, by the bleeding of piles, &c. to resort to it;—and that life and the nutrition of the system are dependent principally upon the newly-formed blood, or the materials of diurnal accession to it, rather than upon the *antiquated* stream. It is also shown that calomel, judiciously employed, is quite as harmless in its character as any other remedy of equal efficacy; and that it possesses, withal, virtues exclusively belonging to itself.

It was Sir Astley Cooper (if I remember aright) who said, as the fruit of his experience, that with the lancet, calomel, antimony, and opium, in their various forms and combinations, he could cure every disease. Now, accepting this assertion in the spirit in which it was dictated, there can be little doubt of its correctness; and if it be true, which I believe it to be, it affords a powerful argument in favour of the theory I have enunciated—namely, that all diseases consist virtually in the derangement of the vascular system — for these are their appropriate remedies, as the numerous affections and their treatment detailed clearly establish.

I have next treated upon those two all-prevailing affections, dyspepsia and nervous derangement; explaining their true characters, and exhibiting by what very simple means they may in general be cured; and that it is not to be accomplished by swallowing physic, but by fulfilling the

laws of our condition—the constitutional requirements of our nature.

This is followed by an extension of the subject of disease, and an explanation of the phenomena and symptoms of the numerous affections of the brain and nervous system, (apoplexy and insanity being largely treated of,) together with some notice of the influence of moral causes and mental emotion in inducing disease of the heart, and in developing a multitude of other affections. This is succeeded by two chapters on the numerous disorders and diseases of the stomach, liver, and kidneys; in which the causes of the extreme frequency of torpor and derangements of the function of the liver, are, I believe successfully, explained; and the development of cholera, gout, rheumatism, piles, and diseases of the bladder in the male, and of the womb in the female, is treated of in a simple way. And on the subject of the liver, I may add, the circulation of the blood through that organ, is, I believe satisfactorily explained, by exhibiting reasons for believing that the stomach and bowels are a respiratory surface, and that the blood here becomes re-vitalized, whereby its subsequent circulation through the liver is effected.

The diseases of the lungs, air-passages and circulating system are next considered; the numerous affections developed in those organs by cold—as cough, sore-throat, inflammation of the lungs, pleurisy, and asthma,—are severally explained. The subject of phthisis or pulmonary consumption, next engages attention, and a reasonable explanation of its causes and varied phenomena is afforded; evincing that it is a disease not primarily of the lungs, but of the general system, and possibly secondary to defect in the cutaneous function.

The subject of fever is next treated of, and an explanation of its phenomena in all their various forms and complications is supplied. It was in treating of this sub-

ject that I first educed the fact, or arrived at the conclusion, that all disease consists, as I have represented, in derangements of the organic capillary system. My explanation of the phenomena and character of the various diseases treated of, I did not indite to suit this *theory;* but the latter arose out of what I had written of them; — which leads me to hope that, with facts for its foundation, the superstructure will prove equally solid.

The views here propounded admit of striking exemplification in an attack of intermittent fever—which in its varied phenomena embodies a disease implicating more or less all the organs. To render this intelligible I shall adduce a case in illustration. A person in health travels through a marshy district; he inspires the paludial or malarious exhalation of the marsh, and with this his blood becomes contaminated, and he is attacked with intermittent fever, or ague. He first feels a sense of malaise; he is languid and oppressed; indicating torpor and general depression of the functions of life. The cause is obvious; his blood, the source of all power, (and from which heat and electricity are evolved,) is deteriorated, less heat and excitement are imparted to the system, and a feeling of cold and weakness is experienced. Every organ is implicated: the heart and circulating powers are debilitated, and in consequence are not equal to the keeping of the blood in free circulation; congestive accumulation in the veins accordingly progressively takes place, more particularly in those parts of the system in which the circulating powers are most feeble—which, for reasons elsewhere explained, I have shown to be the liver and spleen, and hence the sense of fulness and oppression experienced in those parts. As the congestion increases, and withdraws a corresponding quantity of blood from the general current in circulation, the pulse becomes progressively small and feeble; and as the sense of

cold increases, and extends to the muscular fibre, it often occasions a severe and long-continued shivering. This terminates the stage of congestion; the feeling of cold now gradually being succeeded by the opposite condition of extreme heat—which is to be thus explained:—the congestive accumulation in the veins withdraws a corresponding amount of blood from circulation through the lungs; and as absorption from the lungs, as Majendie proved by experiment, takes place in an inverse proportion to the distension of their blood-vessels, a proportionably greater quantity of air (of oxygen) is absorbed, and the combustible or chemical qualities of the blood are accordingly increased. As the congestion in the veins at the same time retards the blood in its passage through the arteries, and as those vessels are more highly endowed, or possess vital attributes which the veins do not, (especially in their capillary extremities, which communicate with those of the veins,) the arterial vessels, through their distension and in consequence of those chemical changes which take place in the composition of the blood becoming effected in them, which are usually effected in the veins, or at a more advanced stage of its circulation, become excited into preternaturally increased action—the condition of *irritation*, or febrile excitement, which is characterised by increased heat of skin and accelerated pulse, the ordinary symptoms of fever.

Thus is fever developed; and a beautiful contrivance it assuredly is for the removal of the obstruction in the veins. As this is accomplished, excitement of the arteries diminishes, and perspiration abundantly ensues, to the restoration of the equilibrium of the circulation, and to the relief of the patient from all his unpleasant symptoms. The cause, however, in this case—namely, the blood's deterioration—still existing, the congestive accumulation progressively recurs as in the first instance, and in like manner is succeeded by

the excitement of fever, and terminates as before by perspiration. Such attacks, commensurately with the amount of the cause and other circumstances, recur every second, third, or fourth day; the intervals becoming progressively longer, or the attacks shorter, as the patient gets better. Otherwise, the attacks become more frequent, and the intermissions less perfect, the exeitement of the arteries, in this case, developing inflammation or extreme exeitement (a destructive process) in the organs in which congestive accumulation was most considerable, or predisposition of parts, or susceptibility of structure, may have rendered most amenable to its influence: and thus will the man whose stomach has been weakened by intemperate habits have inflammation of the stomach; and he whose mind has been too actively employed, or who is subject to determination of blood to the head, have inflammation of the brain, or rather of its membranes, and thus may brain fever be developed.

Brain fever, I would here observe, would appear to be more particularly connected with, or an affection of, the *membranes* enveloping the brain,—a condition of irritation or inflammation; extending by continuity to the brain's substance, and hence the mind's delusive manifestations its delirious wanderings, or more exeited condition,—in contradistinction to *insanity*, which is an affection of similar character, but more especially of the organ itself. But on this subject I must refer my reader to what has been said in the chapter in which this affection is treated of; begging, however, to be permitted to add here, although somewhat out of place, a few *important* observations which escaped me at the time that article was penned. At page 113 it is said, "The disease insanity may be based upon or connected with a state of debility." To this I would add, and with some emphasis, that among debilitating causes malaria may prove to be one, developing congestion and *irritation* in a part of the brain in which predisposition existed,

through anxiety of mind, perturbation, or other cause; in the same manner, precisely, as we see that ophthalmia or inflammation of the eye may be developed by this same cause — namely, malaria; as was the case with our troops in Egypt, and also, as I have often seen, in India. The characteristic symptoms of this cause of the disease and of the brain's excitement would be, as in cases of fever developed by its agency—periods of intermission or exacerbation, in pain of the head or state of excitement, or in the accompanying febrile condition; and the treatment would be in accordance, as one really of intermittent fever with local inflammation. And if to what I have now said be added the explanation I have given, in the same chapter, of tic-douloureux, spasm, and other forms of neuralgia, or nervous *irritation*, it is obvious that these may be also developed by the same cause of excitement, and that they call for the same treatment—in which cases, I may observe, in addition to local bleeding, the vapour-bath and quinine would appear to be the essential remedies indicated, and in practice are found the most successful.

Thus are exemplified the three conditions of the vascular system mentioned, running into each other by insensible gradations, and terminating the life of the patient; this being the sequel of unsubdued inflammation, which, as I before said, is a destructive process. Had the debilitating cause upon the capillary vessels been of a local character, or local as to its effects in producing congestion, so would the *irritation* or inflammation have been partial or local also. This is well exemplified in the operation of another and more frequent cause of fever— namely, cold, if partially applied—to the eye for instance, the eye becoming first congested, then irritated or inflamed. Ear-ache, sore-throat, cough, rheumatism, and a multitude of affections, are thus, as experience testifies, induced by cold partially applied. But its more

extended influence on the system is to produce fever, which I may be permitted to explain. Cold first operates on the skin, in torpifying or arresting its secretive functions of perspiration—the temperature of the surface being reduced below the point necessary to maintain the chemical changes in the blood and the action of the capillary vessels. Those vessels accordingly become congested, and the excitement of *irritation* is induced: this may be trivial in amount, commensurate with the extent of the cause, producing a little febrile heat of surface alone; or it may be more considerable, the perspiratory secretions becoming completely arrested; or the cold's influence may have been extended to the subjacent parts, and then a greater amount of fever will be induced. And this fever will necessarily be without intermission, the cause continuing to operate till the secretive function of the skin is restored. It is obvious also, that the febrile cause may involve and implicate the lungs, air-passages, or other organ, and thus develop irritation or inflammation in these parts likewise. The difference between these two conditions of irritation and inflammation, is only in degree—the first being an augmented healthy excitement of the vessels, increasing secretion and removing obstruction, and the second arresting secretion and perverting the natural endowments of the part, by which mortification takes place, purulent matter is formed, and destruction of the organization is effected; which are the ordinary effects of unsubdued inflammation. The fever, or condition of *irritation*, is obviously a curative effort of the system—the operation of laws of our constitution, which have been ordained for our preservation. In furtherance of the same provident intention of Nature, it is my opinion that the copious perspiration which terminates the attack of intermittent fever, is another manifestation of the same conservative principle, intended to eliminate and expel from the system the malaria

or aërial poison with which the blood is contaminated, and which has given rise to the fever. Hence, too, the operation of malaria is not, as it is too commonly supposed to be, on the nervous system but on the vascular, the blood—the source of nervous power—the mainspring of life; this is deteriorated, chemical action in its composition is diminished, and the development of heat and electricity is reduced also. Irritation, I maintain therefore, wherever located, is not an affection at any time of the brain or nervous system, but of the vascular or capillary system; the nervous system in all cases being quite subordinate and secondary in character to the vascular, although the latter doubtless may be influenced through it. The agent, however, in this case, is but the electricity imparted by the nervous system which it has derived from the vascular;—the chemical changes in the blood being the source of all power—the alpha and omega of all vital action. Hence the fact that an animal may be decapitated, and vitality in the trunk will be still maintained for a certain time, while air is furnished to the blood by artificial respiration to support chemical action. In fine, I am of opinion, it will eventually appear, that the cause or occasion virtually of every disease (mental emotions and moral influences excepted) resides or consists in, or depends upon, the quantity, quality, (or constituents) or temperature of the blood.

Reverting to the subject of this Analysis:—Having treated of the various forms of fever and of its complications, and having explained the principles which should be pursued in their treatment, I have concluded the work by adding, by way of SUPPLEMENT, some general rules founded on the principles unfolded in the body of the work, and have endeavoured to establish them, for the preservation of health, and the renovation and strengthening of the system; and in which the true principles of Hydropathy have been explained, and its prac-

tice to a certain extent approved. The renovating influence of small bleedings is also enjoined, and I trust at the same time perspicuously displayed.

As it will be discovered, that the views with which this work abounds correspond in a great many particulars with those for which Liebig has obtained so much renown, I must be permitted to observe, that in all these particulars I may venture to say, without fear of contradiction, that Liebig has followed in *my* wake—not I in his. And without making any mean accusations, or arrogating to myself claims which are not justly my due, I can truthfully say—that if he have not derived, he nevertheless has had abundant opportunity of deriving, those views from a work published by me as far back as 1830, entitled, " Cholera, its Nature, Cause, and Treatment, with original views—Physiological, Pathologieal, and Therapeutical, in relation to Fever, the Action of Poisons on the System, &c. ; to which is added, an Essay on Vital Temperature and Nervous energy—explanatory more particularly of the nature, source, and distribution of the latter ;"—a title whieh, it is obvious, embodies the subject-matter of Liebig's celebrated work on Animal Chemistry, in its application to physiology and pathology, and first published in 1842, twelve years after the date of my work — and which, I beg leave further to state, was immediately after publication translated into the langnage of Germany, by the then existing Professor De Graef, of Berlin, and from the celebrity of the translator, and the interest of the subject—Cholera, whieh at that time first made its appearanee in Europe—it obtained, as I well know, very extensive cireulation all over Germany.—I shall, I trust, be excused saying thus much upon this subjeet. but less I could not say, in justification of myself.

THE WHY AND THE WHEREFORE;

OR,

THE PHILOSOPHY

OF

LIFE, HEALTH, AND DISEASE.

CHAPTER I.

LIFE—ITS NATURE, SOURCE AND PRODUCTION, AND THE TEMPERATURE OF THE ANIMAL BODY.

1. *Life.*—Few persons have any adequate conception of the nature of life; those who have, or rather fancy they have, very generally confounding life with that emanation of the Divinity spoken of in the Book of Genesis (chap. ii.), where it is said, "God breathed into man's nostrils the breath of life, and man became a living soul." This, let me here observe, alludes to man's distinctive attribute — his spiritual life—that which gave him dominion over the beasts of the field, the fowls of the air, and every living creature—that which constitutes him a rational being, made in God's own likeness—man's immortal spirit. His physical life, which prompts him to action in order to secure and enjoy sustenance in common with the rest of the animal creation, is of a wholly different character; it is, indeed, the result of physical laws, of chemical action, and is thus amenable to the laws of ordinary matter, and of agencies of so numerous and varied a kind, as to be liable continually to interruption or derangement and disease.

It is with this, the physical life, that we have here to do, and which I shall now attempt succinctly to explain.

2. *Vegetable Life.*—The primary condition or simplest form of Life is exhibited to us in the vegetable creation. A seed is put into the ground, and it becomes a living plant: to effect this, however, certain conditions are necessary;—that is, a given amount of caloric or heat, of moisture, and of air, must be present: these are all essential requisites; for without them the seed will not germinate—or, in other words, those chemical affinities and actions will not take place in the constitution of the grain of seed, whatever its description may be, whereby vitality becomes developed. The life of the body is the sum of these actions, and of those developed and excited by their influence in the appropriate organs associated in the maintenance of these primary organic and chemical actions. The grain of seed, under the favourable circumstances mentioned, first imbibes water from the soil; this permeates the grain, and dissolves a portion of the starch which forms a large constituent of its substance; the oxygen of the air, in admixture with the water, seizes upon or enters into combination with the carbon—a constituent of the starch—under the quickening influence of a certain temperature, or amount of caloric, which, as I before said, must be present; and thus, by predilection of affinity, chemical combination and action ensue. As this process is attended with the evolution or development of caloric and electricity—these being the stimuli and cause of all vital action—the germ or embryo of the plant is quickened, that is to say, set in motion, when its structural endowments enable it to absorb into, and assimilate with, its own substance, the pabulum around it of the residual portion of the grain, and subsequently the inorganic substances surrounding it, and contained in the soil and atmosphere; and thus, extending its powers, all the progressive changes in its development and growth take place.

3. *Chemical Action the Cause of Life.*—The chemical action here pointed out is no imaginary process, but is strikingly displayed in an analogous operation, namely, the fermentation of malt liquor; the grain being mashed, or its starchy and saccarine constituents being dissolved in hot water, and exposed at a certain temperature to the air, an active intestine motion, or, in other words, fermentation, or chemical action, ensues; and that this is attended with an evolution of heat, is manifested by the fluid (the wort) increasing 20 degrees, or more, in temperature. Chemical action is, I therefore repeat, the primary link or bond by which motion and life are developed; and this in the simplest form of vitality, as it exists in the vegetable creation, is the means by which inorganic substances—earth and air—are converted into organic or living bodies.

4. In the animal creation, the same facts are exhibited to us in the incubation of the egg. The air of the atmosphere contained in the air-cell within it, and permeating the shell also from without, under a given temperature, (whether that of the warmth of the parent's body, the warm sand of a tropical desert, or the heat of an oven,) enters into chemical union with the constituents of the egg, thus developing caloric and electricity, the animating stimuli of the germ; the development of its structural endowments then takes place, in connexion with the more complex actions of its growth and vitality.

5. *Animal Life.*—With these preliminary observations on Life, its nature and cause, I shall now proceed to explain its source, maintenance, and phenomena in Man. Life, and the warm temperature of the body which accompanies it in man, are both derived at birth from the parent, but are maintained afterwards by the air and nutriment received into the system from without, (through the channels of the stomach and lungs,) by the agency of the chemical affinities existing between the constituent particles of the air and

food, and the actions developed thereby in the appropriate apparatus afforded, by the organization or structural endowments of the system, for their maintenance and exercise:—Life absolutely being the sum of these powers, or results educed, as I have before explained.

6. *The Principle of Life,*—that is to say, the actuating, motive, or nervous power—the 'vital force' of Liebig—is, however, electricity, evolved from the blood (a compound of air and nutriment) under the excitement of caloric, the body's temperature, and its pre-existing electrical or vital condition. This evolution takes place, more particularly at the extreme points of the blood's circulation, in the capillary vessels, or those intermediate, the arteries and veins, in which the final changes in the composition of the blood are effected. These vessels entering into the composition and structure of every organ and part of the body, and constituting by their number the principal part of their substance, fulfil the purposes of nutrition, assimilation, and secretion,—the primary and fundamental functions of life.

7. *The Vital Temperature.*—For the perpetuation of this process, (the development of electricity or motive power,) through the combination and changes which gradually take place in the blood, in these vessels more particularly, throughout the system, between the oxygen, a constituent of the air, received into the blood by respiration, with carbon and hydrogen, (constituents of the blood, and received into it as nutriment from the stomach,) an additional result ensues—namely, the evolution, in the required degree, of caloric, or heat.

8. *The Electro-nervous Power.*—Simultaneously with the slow combustion of carbon and hydrogen in the blood, developing caloric, is the electricity of the system also evolved; the chemical changes attending this process of combustion, or combination of oxygen with the carbon and other elements of the blood, being the principal source

of its development; in like manner as both light and heat are evolved by the combustion, in the fire-grate, of coal, a compound of carbon and hydrogen, by its union with the oxygen of the atmosphere, under the excitement in this case also of heat, (imparted in the first instance by lighting the fire,) but perpetuated afterwards by the caloric of its own generation. Thus the body, when once set in motion, is capable of generating its own motive power, if duly supplied with food and air, like the locomotive steam-engine when furnished with its supply of fuel and air; water in both cases being also essential.

9. That other chemical changes take place in the blood, associated with the processes of nutrition, assimilation, and secretion, which are in like manner attended with the development of caloric and electricity, there can scarcely be a doubt; but that the combustion of the carbon and hydrogen of the blood, and the changes attending this process, are the principal source of the electricity of the system, as well as of the caloric, we are led to infer by the experiments of M. Pouillet and Mr. Read,* and by the fact, that whenever oxy-

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* The French philosopher M. Pouillet, caused hydrogen gas to flow out of a glass tube; when the gas was ignited, a coil of platinum wire was employed to conduct the electricity evolved to the condenser. When the coil was large enough to inclose the flame, and to be about four inches from its external surface, positive electricity was indicated, which became more and more intense as the distance diminished, short of its touching the flame. He found that during the combustion of alcohol, wax, oil, fat, &c., the same phenomena were exhibited as in the experiments with burning hydrogen. He further placed a piece of charcoal in a state of ignition beneath a brass-plate in connexion with the condenser, and the same result ensued—the plate above it, on which the carbonic acid was impinged, becoming positively electrified. These results are borne out fully by the experiments of Mr. Read, who insulated a large hollow tin cone with many yards of small wire coiled up within it, one end of which extended through the apex of the cone, which was open, and was connected with a sensible electrometer; under the cone

gen enters into chemical union with a substance, electricity is evolved, as we see very strikingly exemplified in the ordinary method of its production in the galvanic trough; and that the power generated by such combination is capable of setting matter in motion, or is a moving power, is shown by a variety of familiar experiments.

10. *Organic Life.*—We thus see the source of caloric and electricity, or, in other words, vital temperature and nervous energy, resulting from the chemical changes effected in the composition of the blood, and which take place more particularly in the capillary vessels, or organic structure, in which the final changes in its composition are effected: hence the general and equable temperature at all times maintained, and the vitality, or organic life of the system,—the same as, or analogous in kind to, life as it exists in the vegetable creation.

11. In the animal creation, there is, however, superadded to the organic, or that allied to vegetative life, an animal life connected with organs of sense and volition, and influenced through the medium of the brain and nerves. This is, however, superinduced by, and is wholly dependent upon, the organic life; upon which we shall accordingly speak hereafter.

12. Returning to the primary condition of animal existence, we have represented it to be the organic life, or that evinced in capillary action—a movement or excitement imparted to the vessels* by the electricity developed in their

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was placed a vessel of water, the vapour from which, on rising, was condensed and collected by the cone and wire—when positive electricity was displayed. The same result he obtained also by burning different substances under the cone.

* This may be seen, by the aid of the microscope, in the web of a frog's foot, or the ear of a rabbit; and is one of the most beautiful phenomena imaginable.

fluid contents—the blood; and resulting from the chemical affinities and combinations effected between the atomic or elementary constituents of the blood, and its aërial admixture, under the favourable circumstance of a specific heat—the body's temperature—and the pre-existing electrical or vital condition. This heat, or caloric, is simultaneously developed by the combustion of the carbon and hydrogen of the blood, concurrently with the other changes in its composition which ensue; and is thus opportunely furnished for the perpetuation of the process; in like manner as the heat developed by the combustion of the fuel in the fire-grate perpetuates the process of combustion, and keeps up the fire.

13. *Health, its essential Characteristics.*—If such be the motive power, or principle of life, and the associated inherent warmth of the body, health—the normal condition of life—must consist in, or be connected with, the due and perfect evolution of caloric and electricity, and the consequent action of the capillary vessels, with the functions they fulfil in the circulation of the blood (the blood here receiving its first impulse) and the nutrition of the system; the due action of all the organs being coincident with, and essentially subsidiary to the performance of these, the primary and rudimental functions.

14. *Disease, its essential Characteristics and Elements.*—Again, the derangements of health—or Disease—must also as necessarily consist in the disordered or less perfect way in which those chemical combinations and changes in the blood are effected, by which capillary action is excited, and the heat of the body maintained, as influenced by one or other, or a combination of the following causes, or principally so, mental causes being excepted for the present. *First*—By the external temperature and condition of the atmosphere in relation to its effects upon the system, primarily or secondarily induced; primarily, on the pulmonary or

cutaneous surface (the lungs and the skin) or body, wholly or in part directly exposed to its influence; and secondarily, to its effects on the blood when inspired and received into its composition, with reference to its quality, its pureness or vitiation, its temperature and quantity. *Secondly*—By the quality and constitution of the blood, in relation either to the elements entering into its composition—fluid, solid or aërial, alimentary or otherwise—derived from the stomach, bowels, or other inlet into the system; or to its composition with respect to its elaboration by the digestive process of the stomach and other organs subservient to this process, and of assimilation; or to its composition with reference to its purification by the liver and kidneys, and organs of analogous depurative agency, as the cutaneous or perspiratory.

15. *The Elements of Health.*—The primary elements of health would therefore appear to consist in the quantity, proportion, and fitness of the materials—solid, fluid and aërial, alimentary and respiratory—which enter into the composition of the blood; influenced by a suitable or given range of temperature from without, conjoined with the integrity or perfectness of the organs, as essential to the due performance of their respective functions in the reception into the system of its elementary constituents, and in the elaboration and purification of the blood. To these conditions must be added the proper action of the heart and vessels of circulation, as subsidiary to the distribution, renovation, and purification of the blood; that fluid being the pabulum both of life and heat, as well as the rudimental or raw material for the nourishment and structure of every organ and part of the system. And lastly must be added the proper condition and action of the brain and nerves, as the directing and associating organs and the imparters of power to all the functions of the body,—the recipients and distributors of the electro-nervous power.

CHAPTER II.

THE NATURE AND FUNCTIONS OF THE VARIOUS ORGANS OF THE BODY.

16. HAVING thus presented a condensed outline or brief sketch of what constitutes Life, Health, and Disease; in extension of the subject, I must next direct attention to the nature and functions of the several organs constituted for the reception into the system of the materials—solid, fluid, and aërial—or elementary constituents, of the blood; as well as to those concerned in the formation or elaboration of these materials into blood; and likewise, to those concerned in its circulation and purification. And lastly, I shall direct attention to the brain and nervous system, from and through which, power is communicated to all the organs.

17. In accordance with this classification, I shall begin with the stomach; the function or office of which is, to digest or dissolve and animalize the alimentary material or food received into it, and thus render it in a fit state for absorption and reception into the blood-vessels, for admixture and circulation with the general current of the blood, of which it now constitutes a part.

18. *The Stomach, its Character and Structure.*—The stomach is a membrano-muscular bag, of the shape of a bag-pipe, and of sufficient size to contain, when distended, three pints or more. It has two openings into it; one above for the admission of food and drink, and communicating by the gullet with the throat and mouth; and the other commu-

nicating with the continuous tube of the intestines, from which it is separated only by a contraction or annular division called the pylorus. The substance of the stomach is made up of three coats, or strata, covering each other like the coats of an onion. The first or internal coat is the absorbing and secreting, or mucous membrane which comes in contact with the food, and is the most essential agent in the process of digestion. The second is the muscular coat, or coat of contraction and motion; by means of which the capacity of the stomach is diminished or extended, and thus the mucous coat is kept at all times in contact with its containing materials for the purpose of digestion; and by which, as digestion is effected in every successive portion of the alimentary material brought in contact with the secretion of the mucous membrane, it is moved forward and extruded through the pylorus into the intestines. The third, or peritoneal coat, being the external one, is a mere covering, formed by a duplicature or fold of the peritoneum or membrane lining the cavity of the abdomen or belly, embracing the entire organ, and tying and confining it to its appropriate situation, and on which the blood-vessels and nerves unite and subdivide before distribution to their respective parts.

19. *The Peritoneum.*—The same membrane (the peritoneum) I may here observe, in like manner embraces and gives a coat or covering to the intestines and the whole of the organs contained in the abdominal cavity for the confinement of each in its proper situation: and from this is secreted a serous or watery exhalation into the abdomen, for lubricating the organs and facilitating their free movement upon each other.

20. In the healthy condition there is no fluid, a vapoury exhalation alone existing; excess of this, or a watery fluid—the serum of the blood being poured out—constituting dropsy.

21. *The Intestines, or Bowels,*—as they are called, are a continuous tube in connection with the stomach, and separated from it only by the contracted portion called the pylorus; in structure they consist, like the stomach, of three coats,—a mucous coat, for the secretion of a lubricating fluid, for the protection of its surface, and facilitating the passage of substances through the intestines; and secondly, for the absorbing or sucking up of their alimentary fluid contents,—a muscular coat of contraction and motion; and a peritoneal or retaining coat. The entire length of the intestines is about thirty feet. The first three fifths, commencing from the stomach, and being less in calibre than the remainder, are called the small intestines; these terminate in a pouch called the cæcum, from which arises the colon or principal large intestine, which, terminating in a descending straight portion, is now called the rectum; the latter terminating in the external aperture, called the anus or fundament.

22. *The Digestive and Subsidiary Processes.*—The structure of the stomach and bowels being explained, the function of these organs in digestion, and their subsidiary processes, may be now readily understood. Digestion, I must first observe, is a duplex process—a chemico-vitalizing operation of solution and assimilation. It is thus effected: the food previously masticated, (or, in other words, comminuted by the teeth, and mixed with the saliva, or spittle, and the air of the mouth,) being now swallowed and conveyed by the gullet into the stomach, is brought into contact with the mucous membrane, and submitted to the operation of the gastric juice,—an acidulous, highly electrical or vital product, secreted or separated from the blood circulating in the mucous membrane by the agency of the electrical or nervous fluid furnished by the brain, and brought to the stomach by the pneumo-gastric nerves, which more particularly connect

these two organs. The excess of alimentary fluid, when present, being first removed by absorption or the imbibition of the veins of the mucous membrane, the remaining alimentary substance, by the contraction and movement imparted to it by the muscular coat, is now successively brought in contact with the mucous membrane and blended with the acid secretion—the gastric juice exuding from its surface—and being by these means partially dissolved and assimilated, is in this digested state progressively extruded through the pylorus into the intestines. A few inches down the intestines the digested matter is rendered more fluid by the admixture of the secretions of the pancreas (or sweetbread) and liver. The secretion from the former viscus is a fluid like saliva, and that of the latter an alkaline, bitter, yellow fluid—the bile; these in a united stream dribble into the intestines here through a small opening, the mouth of a duct or tube, which communicates with those glandular organs the liver and pancreas. The addition of these secretions not only renders the compound more fluid, but still further alters and vitalizes the product, (as I shall presently notice,) whereby it becomes fit for absorption and for reception into the blood-vessels. Thus rendered, its fluid and more nutritious particles are imbibed by the veins and absorbent vessels distributed over the mucous membrane, as it proceeds to travel along its surface by the agency of the contraction and worm-like motion imparted to the intestines by their muscular coat, till it arrives in the cæcum or pouch communicating with the colon, or large intestines, the receptacle of the more gross and insoluble parts of the aliment; and wherein it is retained and becomes solid by the further absorption of its fluid particles, till the distension arising from accumulation excites the necessary desire for its expulsion from the bowels and extrusion from the system.

23. *The Gastric Juice,*—as already mentioned, is an

acidulous fluid; the acid it contains is the hydrochloric or muriatic, the source of which is the muriate of soda, or common culinary salt contained at all times in the blood. The blood in the secreting vessels of the mucous membrane being brought under the agency of the electrical current furnished by the brain, and transmitted by the pneumo-gastric nerves which connect the brain with the stomach, the muriate of soda becomes decomposed; the muriatic acid, one of its elements, is poured forth with the secreted fluid into the stomach; and the other of its elements, soda, is transferred with the remaining constituents of the blood, by the veins of the stomach, to the liver, where it next becomes separated as the alkaline constituent of bile secreted by that organ.

24. We have here presented to us one of the many very beautiful contrivances of the economy of nature. The blood is at all times essentially an alkaline fluid, and from this has to be eliminated an acid solvent of the food—or material from which the blood itself is to be formed, but from which as an acid, so incompatible with its existence as blood, it must necessarily be detached before it can be received into the circulating current. How admirably are these manifold purposes accomplished!—by the decomposition of a neutral and harmless element of the blood into its two very active constituents, and their recombination when the purposes of their separation have been fulfilled;—the alkaline fluid (bile) flowing into and being mixed with the acidulous digested aliment, immediately it has passed from the stomach into the intestines, and, thus neutralized, adapting the compound for absorption and reception into the blood. How beautiful an illustration of design!—how admirable a contrivance of the Divine Architect!

25. *The Chyle.*—The nutritive and partially assimilated alimentary juices, called chyle, being absorbed from

the stomach and bowels, and received into the blood-vessels, and now in admixture with the blood, are conveyed to the heart, and thence to the lungs; wherein they are next exposed to the influence of the air inspired from the atmosphere, and thus become blood; from which ensue an after train of most important results hereafter to be explained.

26. *The Lungs, or Respiratory Organs,* (contained, with the heart, within the chest,) or Lights, as they are commonly called in the lower animals, from their spongey, light, cellular structure.—The structure and functions of these organs are the next objects of our consideration.

27. The lungs consist of air-cells—the terminations of the branches and subdivisions of the wind-pipe, called bronchi—and of blood-vessels; the latter accompanying the bronchi, and subdividing into innumerable capillary or hair-like terminations distributed over the air-cells;—an arrangement by which the blood and the air are mutually brought into contact, the thin coats of these vessels, which are permeable to the air, alone interposing. By the agency of this contact, the blood, which, when propelled from the heart and distributed over the air-cells, was of a dark purple or nearly black colour, is now, by contact with the air, rendered of a bright scarlet hue. The blood has now parted with or exhaled from it, the carbonic acid gas (ăcriform charcoal) with which it was charged when brought to the lungs, and has absorbed, or imbibed in exchange for this, a portion of atmospheric air—a gaseous compound of nitrogen and oxygen, the elements of life and heat, with which it now returns to the heart. The blood thus purified, and enriched with the nutritive juices previously received into it from the stomach and bowels, and with the air from the lungs, is replete with the principles of life and heat, and all the elements essential to its constitution, and is now circulated

to the system at large, for the building up and nutrition of the body, and the maintenance of life, by the development of caloric and electricity which follows the changes which take place in its composition during its circulation.*

28. *The Heart and its Function in the Blood's Circulation.*—The heart, situate and surrounded by the lungs within the chest, is a double organ; the two halves of the heart fulfilling respectively the offices of a forcing-pump and a sucking-pump;—one half presiding over the circulation in the lungs; and the other over the circulation in the rest of the system, or the body at large. Each half of the heart is a hollow muscular organ, alternately dilating and contracting—its capacity becoming enlarged in the first instance, and diminished in the last. Its action or impulse is attended with considerable force, (as may be felt by the hand on the chest,) and is synchronous with the pulse felt at the wrist or elsewhere; pulsation being caused by each successive wave or jet of blood expelled from the heart by its contraction, and flowing in constant succession through the artery, and numbering, according to the age and constitution of the individual, between 150 pulsations or more in a minute, at the time of birth, and about 65 (its minimum) at mature age.

29. *The Heart's Action; the absorbing power.*—The heart is also the principal agent of absorption—sucking or imbibing into the vacuity formed by the dilatation of its cavity not only the blood furnished to it by the veins, which all terminate in the heart, but the air also, through the coats of the blood-vessels in the lungs, as well as the air from the skin on the surface of the body; and likewise the fluid nourishment from the stomach and bowels;

* As some ambiguity may exist with reference to the meaning of the term *nutrition*, let it be distinctly understood that I confine its signification to those elements of the food in the blood exclusively devoted to the building up and repair of the body, (see page 253,) in contradistinction to those elements which are far more abundantly provided for the maintenance of the temperature and vitality of the system.

—aided, doubtless, by the superincumbent pressure of the atmosphere, as well as by the partial vacuum formed by the expansion of the chest, in which the heart is situated.*

30. The blood, being replenished with the fluid nourishment imbibed from the stomach and bowels by the absorbent vessels (another system of vessels, which will be treated of presently) and the veins, is also, by the dilatation of the right side of the heart, drawn into its cavity; from which it is by its succeeding contraction as instantly expelled with great force through the vessels in communication with the lungs, and distributed over the surface of their air-cells. The blood exhales during this process the carbonic acid gas it contained, (formed by the chemical union, during its previous circulation, of the oxygen of the air with the carbonaceous constituents of the food,) and returns to the heart enriched with the air of the atmosphere, with which it has been brought into contact, and which it has imbibed by the dilatation of the left side of the heart. Thus purified and enriched, and replete with all the elements of life and heat and the substance of the body, the blood is now propelled with great force by the contraction of the left side of the heart, from the cavity into which it was received by the lungs, through the aorta or main trunk of the arteries, and circulated through its nu-

* The chest is an air-tight cavity, separated from the cavity of the abdomen by a muscular membranous division—the diaphragm, or midrif; the descent of which, conjoined with the elevation of the ribs, enlarging the capacity of the chest, the air enters by the nostrils and windpipe, and thus distending the lungs, inspiration is effected. And expiration by the reverse action—the ascent of the diaphragm and descent of the ribs. It will thus be obvious, therefore, that the enlargement of the capacity of the chest must necessarily occasion a partial vacuum, and consequently dilatation or expansion of the lungs, and facilitate likewise the exhalation of the carbonic acid gas from the blood during inspiration; and the reverse by expiration—the air in the lungs must by the compression which arises be condensed, and imbibition of it by the veins be facilitated.

merous ramifications to all the organs and every part of the system;—where, in the organic structure, or capillary vessels (hair-like tubes) intermediate between the arteries and veins, (the vessels of nutrition, accretion, and secretion,) those final chemical changes in the composition of the blood, connected with the evolution of caloric and electricity, take place,—whereby capillary action, or the organic life of the system, is maintained, as before explained.

32. *The Absorbent Vessels.*—These are a set of tubes permeating all the structures, and fulfilling the purpose of so many conduits or drains throughout the system; absorbing or imbibing the fluid surrounding them, extravasated or poured out by the blood-vessels, or other fluid in which they may be immersed; this fluid infiltrating itself into their cavities, and being by these canals restored or returned into the general circulation by the veins in which the absorbents all terminate.

33. *The Lacteals,*—or vessels distributed over the mucous coat of the intestines, absorb from the bowels a portion of the nutritive juices imbuing their surfaces. These juices being of somewhat milk-like appearance, the name of Lacteals has been given to the vessels by which they are absorbed. They are numerously distributed over the bowels, and eventually unite in one common trunk communicating with the jugular vein.

34. It must here be observed, that these absorbent vessels appear to be quite subordinate or accessory to the veins, which I consider the principal vessels of absorption throughout the system; Majendie having most satisfactorily proved, by his very numerous experiments, that the veins are the principal imbibing vessels, and that absorption is carried on by them exactly in the inverse ratio to their fulness and distension; and that when from repletion they cease to absorb, exudation ensues. Hence the necessity and use of these vessels as essential accessories to the purposes of absorption; for

without them dropsy and stagnation of the fluids would be of frequent occurrence from plethora, or other cause of retardation in the venous current.

35. And thus again, Majendie having proved that absorption from the bowels is principally effected by the veins, we have another very beautiful manifestation of the conservative power, or the adaptation of means to provide for the well-being of the system. The veins from the bowels all terminate in a united trunk for circulation through the liver; and thus every instance of engorgement of the liver, or obstruction of the circulation through this organ, would cut off the supply, not only of nutriment, but of all fluids, into the system. Hence the necessity of this accessory system of absorbent vessels, or conduits of fluid, into the circulation. Without some such provision, we should, under these circumstances, be dried to death!

36. *The Purifying Organs.*—The blood, having now completed its circuit, and fulfilled its destined purpose, requires renovation; and with this object the accession of new elementary materials is required for the maintenance of nutrition and combustion. Moreover, it has become deteriorated in quality also, by the acquisition of the old and exhausted particles or elements of the system returned by the absorbent vessels into the circulation, as well as by others resulting from combustion, and the chemical changes and new combinations which have taken place among the elements of the blood during its circulation; besides others, of deteriorating quality or objectionable character, which may have been imbibed with the air and nourishment, and received into the blood from the stomach and lungs. It will thus be seen that it requires purification as well as renovation. Hence, there are provided certain purifying organs for the separation of all such objectionable and excrementitious particles, which are accordingly secreted or separated from the

blood, in the form of urine by the kidneys, or bile by the liver; and the aërial impurities are extricated by the lungs and the skin—in the form of carbonic acid and other gases, concurrently with the pulmonary exhalation and perspirable secretion.

37. *The Kidneys.*—The nature and functions of these organs are accordingly next to be considered.—The kidneys are two in number, situated in the loins at the back of the abdominal cavity, at the root of the liver, and close to the spine. The blood being brought by an artery to each kidney, the urine, or surplus watery and saline particles, is separated from it by the agency of the electric current, or nervous power supplied by the nerves with which it is endowed, during its circulation through the structure of the organ; the urine, as it becomes secreted, infiltrating itself into the cavity within its centre, and from which it passes down the urinary duct or tube communicating with the bladder; and as there are two kidneys, there are consequently two ducts by which it is conveyed into the bladder, where it is retained until that organ, irritated by distension, becomes excited to contract upon and expel its contents, or until the same is effected at the pleasure of the individual.

38. *The Liver.*—I shall now, after a few remarks on the structure and situation of the liver, proceed to explain the secretion of bile and the functions of the liver.—The liver is what is technically called a glandular structure, and the largest organ of the body. Surmounting the intestines, it occupies the whole of the right side of the abdominal cavity; from the kidneys behind, it extends in front under the ribs and across the pit of the stomach towards the left side. It must here be noticed, before treating of its function, that the blood supplied to this organ for purification, is that which has just before circulated through the vessels of the stomach and bowels, as well as that returning from the spleen and

pancreas; and is therefore, as venous blood, not only deprived of its more important heat-producing and vitalizing properties, but is moreover charged with the alimentary juices absorbed by the veins of the stomach and bowels. This last-mentioned circumstance is one deserving especial notice, as marking another beautiful provision of the Almighty, by which unwholesome substances and objectionable particles, which may have been imbibed from the stomach and bowels, and contaminate the vital stream, are eliminated and separated from the blood coming from those organs. The fluids from these organs are accordingly for this purpose of purification first circulated through the liver, before they are admitted into the general current returning to the heart for circulation to the system at large.

39. *The Secretion of Bile.*—The blood then from the stomach, bowels, spleen, and pancreas, brought by their respective veins, and united into one current in the portal vein formed by their junction, is now circulated through the substance of the liver, and is there purified by the secretion or separation from it, under the agency of the electrical current furnished by its nerves, of a yellow, bitter, alkaline fluid, called bile—which is conveyed by an infinitude of small collecting ducts, after they have coalesced and are united into one common trunk, into the gall-bladder (a small receptacle for its occasional retention) and intestines.

40. The bile flowing into the bowels, a few inches below the pylorus or continuous tube of the stomach, the soda, its alkaline constituent, recombines with and neutralises the acid of the stomach's secretion,—which it here meets with in admixture with the alimentary material (as we have before noticed) in its passage from the stomach; and to which further, as an electrical product, the bile, conjointly with the pancreatic secretion, gives increased vital qualities: and thus assimilated, the nutritive juices are absorbed from the

compound during its passage into the large intestines. The effete or objectionable particles of the bile, with the refluent portions of the aliment accumulating in the large intestines, into which they are gradually conveyed, are in due time expelled, as previously noticed.

41. *The Pancreas.*—Having mentioned the spleen and pancreas, I shall briefly remark, that they would appear to be two organs of no very great importance in the system. The pancreas, or sweetbread, like the salivary glands which pour their secretions into the mouth, secretes a fluid much of the same nature as saliva, and which is poured into the intestines with the bile, for the purpose of rendering the digested substance proceeding from the stomach more fluid, and thereby more fit for absorption, and also as a vital fluid assimilating or adding to its vital qualities.

42. *The Spleen.*—The spleen, it would appear, is of much less importance under the ordinary circumstances of the system, inasmuch as the melt, as it is called, has often been removed from animals without their appearing, after recovery from the operation, to be in any way injured by the loss. The spleen is a spongy distensible organ: its office I believe to be in character that of a safety-tube, receiving into its substance the blood when repelled from the surface of the body by the sudden application of cold. By the contraction of the blood-vessels, and consequent impediment to the circulation on the surface through the influence of cold, the blood would be suddenly thrown in augmented quantity into the interior organs, which would be liable to produce engorgement of the heart and rupture of its vessels, were the spleen not to provide for its reception. Hence I believe it is, that more permanent enlargement of the spleen so constantly succeeds to repeated attacks of the cold or congestive state of an ague, or intermittent fever.

43. *The Skin, its numerous and very important Func-*

tions.—The functions of the skin must now be noticed, as accessory to those of the lungs. The skin is, indeed, as well as the lungs, a respiratory organ, inasmuch as the blood circulating over the surface of the body exhales therefrom carbonic acid gas, and absorbs in return an equivalent portion of the atmosphere which surrounds it. The skin is at the same time an important secreting surface, excreting from the blood, and thus purifying it and divesting it of certain watery, acidulous, or saline and odorous particles—the perspirable transudation.

44. Lastly, the skin and lungs are associated also in another very important function—that of regulating the temperature and moderating the excitement of the system. This the aqueous exhalations from the skin and lungs, as conductors of heat and electricity, are the means of accomplishing. And hence the febrile heat and irritability which exist when the pulmonary or perspirable secretions are suppressed; a dry skin being an exceedingly bad conductor of electricity as well as of caloric.

45. The functions of the skin and lungs I believe to be quite of a supine character in relation to the chemical changes effected in the blood through their instrumentality; being in this respect merely the organs whereby approximation takes place between the blood and the air. The atmosphere, consisting of four parts of nitrogen and one of oxygen, is absorbed or imbibed into the system with the blood from the lungs by the heart's dilatation—the quantity being proportionate to the heart's power, the capacity of the lungs, and the state of fulness of the blood-vessels; absorption from without, experiment having proved to be going on in the inverse ratio to distension of the vessels,—that is to say, the fuller the vessels the less their capacity and the amount of absorption that takes place. Nitrogen as well as oxygen are both received into the circulation in

the simple state of admixture as they exist in the atmosphere; and both enter into chemical union with the blood during the course of their circulation, in quantities proportionate to the affinities existing between them respectively, and the other constituents of the blood—under the excitement of its temperature and electrical condition.

46. For the further explanation of the purposes enumerated, as well as the especial functions with which the skin has been endowed, as an organ of sense, (feeling and touch,) I shall briefly add a few important particulars regarding its structure. Its requirements are obviously high vascularity and nervous sensibility, and with these it has accordingly been endowed,—the dermis, or true skin, being so abundantly supplied in these respects, that it may be regarded as composed of blood-vessels and nerves alone; for the protection of which it has been, however, covered with a thin mucous coat, and external to this the cuticle, or scarf-skin, to blunt, in some respects, its sensibility, and preserve it from injury. The universal and equal redness of the skin in blushing, is a proof of its great vascularity; but a still stronger proof consists in our being unable to direct the point of the finest needle into any spot, without drawing blood. The same test proves the equal abundance of nervous filaments, for not a point can be punctured without causing pain; and thus is evinced its extreme sensibility, as a guard against accidents and injury. As a secreting organ, it partakes moreover of a glandular structure, eliminating two pints or more fluid, by invisible perspiration, during twenty-four hours; and a much greater amount when, by exercise or heat, it sensibly bedews the surface. It is said, indeed, that a robust man, engaged in hard labour, and exposed to intense heat, has been known to lose five pounds weight in the course of an hour! I

mention this merely to show the great importance of this function to the system.

47. *Electricity, the Excitant of all the Functions.*—Having briefly explained the functions and structure of the several organs concerned in the formation and purification of the blood, as well as of its circulation, I have one other observation to make, before dismissing the subject—which is, that as capillary action, or organic life, is the result of electrical excitation, developed during the changes which take place in the composition of the blood in its passage through the capillaries, or principally so; so the more complex actions, or functions of the several organs we have been speaking of, are effected by the agency and excitement of electricity, though, perhaps, when thus employed, in a more concentrated form, or intense condition, than that in which it is generated or developed in the capillary system, and thence transmitted by the collecting nerves to the ganglions, or centres of this the sympathetic system of nerves—the centres of accumulation and supply of the vital organs, or those concerned in the formation, purification, and circulation of the blood. From these ganglions, situated in the abdomen and chest, is the electricity in this more intense form, or condensed condition, supplied, in accordance with the requirements and necessities of the several organs, through the instrumentality of their respective nerves.

48. *The Connexion between the Body and the Mind.*—And further, Mr. G. Rainey has lately demonstrated that the arachnoid membrane, which envelopes the brain, consists of a plexus, or expansion of the same nerves (the sympathetic) which accompany the carotid arteries in their distribution to the brain, and hold likewise immediate connexion with the large ganglions in the neck, and the

rest of the nerves of the sympathetic system.* Hence the sympathy, or general consent and association, existing between all the organs, and the connexion between the body and the mind,—the brain being the seat of its manifestations, or the organ of the mind: and hence likewise the integrity of the functions—the reflex actions and dependence of the organs of the body upon the state of the mind—and this upon the former;—considerations which lead me next to treat upon the brain and nervous system.

49. *The Brain and Nervous System.*—Animal life, I before remarked, is superinduced by, and wholly dependent upon, organic life: and as human existence is essentially connected with organs of sense and volition, these are accordingly influenced by, or acted upon through the medium of, the brain and nerves. The nervous system consists of brain and spinal marrow, (the latter being a prolongation of the brain, and extending from the skull down the spinal column,) and nerves, or fibrous cords. The nerves proceeding from, and being connected with, the spinal marrow and brain, are the conductors of electricity, (like the wires or chain of connexion employed in an electrical battery,) and of impressions from and to these organs. To fulfil both these purposes, there are necessarily provided two sets of nerves—one of sensation, and the other of volition; the former being connected with the posterior, and the latter proceeding from the anterior column

* See, in the "Lancet" of 21st February last, Mr. Rainey's paper, read before the Medico-Chirurgical Society. Since that paper was published, I have been gratified with an interview with Mr. Rainey, who has, by the aid of the microscope, demonstrated to me, in the most satisfactory manner, the justness of his conclusion: I feel no hesitation, therefore, in assuming it as a fact beyond controversy. To Mr. R. is due the honour of having thus discovered what, it appears to me, was alone essentially required to complete our general knowledge of the nervous system.

of the spinal marrow; and the brain, of which these columns are a prolongation.

50. *The Sympathetic System of Nerves.*—To these are added another set of nerves—those previously noticed—the sympathetic, which are connected with the arterial system and capillary vessels, in which the final changes in the blood are effected. Accompanying the arterial trunks, or rather returning with them from their capillary extremities, these collect the electricity as it is developed in all and every part of the system, and transmit it to the ganglions, as I before noticed, for distribution to the vital organs, and to the brain, of which I shall now speak more particularly.

51. *The Brain's Source of Electrical Power.*—The amount of electricity developed in any part, is necessarily in proportion to the quantity and character of the blood (the arterial only being the source of its development) supplied thereto. Now, the brain is said to be furnished with a threefold greater proportion of blood than any other organ, it being supplied with four vessels, the two carotid and the two vertebral arteries. Hence the quantity of electricity developed being considerable, the numerous collecting nerves which accompany the ramifications of these vessels in the substance of the brain, or rather returning with them, unite, and form the arachnoid membrane, or plexus, which enfolds the brain and spinal marrow in connexion with it. The electricity thus furnished, and accumulated in the arachnoid plexus, becomes thus an available fund for the excitement of these organs in all their functions, though connected, at the same time, with that of the vital organs.

52. *The Respiratory and Excito-motary Functions.*—The spinal marrow, like the brain, consists of two entire halves, each consisting, not only of the two columns previously noticed of the brain's substance, connected with sensation

and volition, but of two others also—in which its especial functions reside—that of the excito-motary or reflex functions of animal life; by which excitement is imparted to the respiratory organs, by nerves proceeding from, and in communication with it, and by others by which food is swallowed, and the contents of the bowels and the urine are expelled, and various other operations of the like important nature are effected. These functions being, then, all primary, in the scale of animal existence, to the sensorial and mental, or those of the brain, are accordingly the first to receive electrical excitement, and the last to be deprived of it as long as any is generated in the capillary system of these organs; for the blood of the arterial ramifications of the spinal marrow is a source also of its production.

53. *The Brain's Function.*—The spinal marrow in all these functions is thus maintained in excitement, as well during the period of sleep as in that of wakefulness. The quantity of electricity surplus to these necessities of animal existence, is imparted to the brain, which it excites to the various operations of the mind, and the organs of sense connected with it, to their respective functions. And thus we see, hear, smell, and feel, at all times while awake, or, in opposition to the condition of sleep, are alive to all the impressions of sense. Or the electricity is transmitted by the second set of nerves from the brain—the motor—to the numerous muscles of the body, for their excitement; and thus I will, by an act of my mind, to move my arm, and am enabled to move it, transmitting, in the act of volition, the electrical power along the nerves of connexion with the brain, to the muscles of the arm, which is thus moved by their contraction. And thus, too, is spasm or excitement of the muscles induced, in opposition to the will, by irritation in the brain or spinal marrow, at the origin of the nerves of the excited muscles; or, in other cases, palsy, or

loss of volition over the muscles, induced by pressure of blood, as in apoplexy, seated in these parts; or loss of sensation, if seated in other parts of the same organs.

54. *The Progression of Death.*—By the arrangement pointed out in the functions of the respective organs and the distribution of the nerves, it will be obvious that the vital and mental organs, although distinct in their character, are united with respect to the source and fund of motive or electrical power. And it will be further obvious, from what has already been said, and from what follows, that as long as any electricity is generated in the capillary system, the heart and vital organs, being in their functions primary in the scale of animal existence to the brain and spinal marrow, will be the first to receive an electrical supply, and the last to be deprived of it. The next, as subservient to these, will be the functions of respiration, and others of the spinal marrow; and lastly, those of the brain in sensation, volition, and its further attributes. Hence an animal will live a considerable time after the brain has been removed, provided respiration, the source of the blood's vital qualifications, is artificially maintained. And after respiration has ceased, (a function derived from the spinal marrow, but dependent, or principally so, upon the electrical supply furnished by the brain,) and the apparent death of the animal, vitality in these organs is still found to exist, the peristaltic motion of the intestines continues for a considerable time, and capillary action, or organic life, continues for some hours after this has ceased—that is to say, for so long as any blood is furnished by the arterial trunks for chemical change, and the maintenance of capillary excitement: and hence it is, also, that the arteries after death are found empty.

55. *Resuscitation from apparent Death.*—And thus it is that, by re-aerating or oxygenating the blood by inflating the lungs, and imparting heat at the same time, if the

temperature of the body is reduced (as it is in drowning), vitality or animal life is so frequently restored to the apparently dead. The inflation of the lungs with warm air is obviously the most successful practice, as fulfilling both purposes.

56. *Transcendant display of Harmony and Design.*—In support of these views—that the blood is the source of the nervous power, and that the brain's office is quite secondary to the rest of the functions—I may adduce another exemplification of the beauteous and harmonious design of our admirable Architect and adorable Creator. The aorta, or main trunk of the arteries, proceeding from the heart, at once forms an arch, from the summit of which the carotid and vertebral arteries perpendicularly arise. The blood has therefore in its passage through these vessels to the brain to ascend in opposition to its gravity; the rest of the blood proceeding along the aorta taking a downward course and meeting with no resistance. Hence, whenever the heart is enfeebled—that is, its propulsive power diminished—the aorta will not be so fully distended; when the blood circulating through this vessel will take the downward course, and the brain's function, as secondary to the rest in importance, will be the first in the series to be diminished. This is beautifully illustrated in the fainting which succeeds to bleeding, and the giddiness which attends debility. In the first case, place the individual in the recumbent posture with his head low, and he is immediately restored to animation; and the recumbent posture is equally beneficial in the second case. It goes far to show also how sleep is induced by the fatigue of the day; but this will be noticed in its proper place.

57. *The Accumulated Fund of Electro-nervous Power.*—The accumulated income of electro-nervous power of the arachnoid plexus, and of the ganglions of the sympathetic system,—which, as I before said, is a united

fund,—is not to be supposed at any time considerable in amount; seeing the demands upon the fund are so constant and manifold,—for the excitement of the respiratory muscles, the heart's power, with the digestive and numerous secretive functions, which are at all times in operation even during sleep; and further, when awake, for exciting the organs of sense, the mind, to thought and the exercise of its faculties; and for actuating also the powers of volition in muscular contraction. It is reasonable to suppose that the expenditure of electricity at most times is equivalent to the supply, or nearly so—its abundance exciting the brain to its expenditure: hence, "he whistled as he went for want of thought;" and hence it is, also, that young animals are always so gay and frolicksome. But that its expenditure in general equals the supply, is pretty obvious from the fact, that the arrest of respiration, and the consequent cessation of the production of electricity in the system, is so immediately destructive of life. The expenditure in some cases not being proportionate to the supply, or the brain or some portion of it having too attractive a power, may be a cause, in some cases, of insanity—the mental organ or faculty being thus kept in a state of constant or undue excitement. At all events, it would occasion many extravagances of conduct, and make good the axiom, that when a man is not well engaged, he is sure to be in mischief; for it is clear that mental or bodily action must be in constant operation as long as life exists. And hence, too, the wretchedness of *ennui*, or excitement of the mind without object, experienced by those who are without occupation; or, in the opposite condition of the brain, when the stomach is kept in a constant state of excitement by excess of its occupation and tit bits, that the mental organ is not duly excited; making good the passage in Shakspeare that—"Fat paunches have lean pates; while dainty bits make rich the ribs, they banter out the wits."

And, in like manner, may idiotism be dependent, in some cases, upon defect in the communication of electrical excitement to the intellectual portion of the brain.

58. *The Brain—its Division into Parts, and their several Functions.*—The brain, in a restricted sense of the word, we may concur with Gall and Spurzheim in considering as the organ of the mind; but, I am not prepared to say anything of their division of it into parts as numerous as there are faculties. But speaking of the brain in the aggregate—that is, of the whole substance within the cranium—we may well assign to different portions the fulfilment of different purposes. The upper hemispherical portions—the cerebrum, surmounting the medulla oblongata, consisting of numerous convolutions of the brain's substance, united to the central fibrous medullary structure, in a manner analogous to the intestines on the periphery of the mesentery—is the organ (speaking of it as a whole) the functions of which are intellectual. The medulla oblongata—meaning thereby all the inferior part of the brain, from which the nerves of sense arise—is the organ appropriated to receive the impression of the senses; and which it communicates to the mind, by the blending of its nervous fibres with those of the cerebral hemispheres in the medullary portion of the latter. It is very clear that the senses are all united in function, (in short, they are all in reality of the same character, the organs being modified in form only, to be amenable to the varied form of matter with which they are severally to be brought into contact or impressed,) as they are only thus conjointly under the power of volition; as a proof, I cannot will to *see*, without both hearing and smelling; nor have I the power to arrest the functions of either singly, but the whole may be stopped simultaneously by going to sleep; and thus it is, that the motor or muscular nerves of the organs of sense arise also from the medulla oblongata,

as they are essentially united in the fulfilment of their respective functions; and hence also is it, that the medulla oblongata is formed by the crura cerebri et cerebelli, or that at least they enter very largely into its composition, thereby blending the animal or voluntary functions with the mental, in this organ, as it participates in and is conducive to the functions of both, which are conjointly in operation.

59. *The Brain, its Condition in Sleep, Dreams, &c.*— The state of being awake, or alive to all the impressions of the senses, I am of opinion is that in which the current of electricity imparted to the brain from the arachnoid plexus passes through, or is extended to the medulla oblongata; and thus are the senses and all the functions maintained in a state of excitement. Whereas, in sleep, the stream of electricity is directed into a different channel—wholly passing off, perhaps, by the pneumo-gastric and respiratory nerves—which accordingly take their rise from the summit of the spinal marrow and below the origin, from the medulla oblongata, of any of the nerves of sense. Hence it is that digestion and the secretive processes are so much more active during sleep, the perspiratory process being necessarily included, and thus by rendering the surface moist and a better conductor of electricity, allowing it to escape more freely from the system. And dreams, we may infer, are occasioned by the excitement of the intellectual organ—the pneumogastric and respiratory nerves and functions in operation not withdrawing the electricity as fast as it is supplied: and from the same cause is it, that it is so difficult to sleep with an empty stomach, the electric power not being engaged in the digestive process; and the converse of this—namely, the propensity to sleep after a full meal. Finally, the spinal marrow, and the cerebellum to which it is appended and by which it is surmounted, are unitedly organs more especially appropriated to volition and the numerous functions more particularly characterising ani-

mal existence; to the excitement of which, accompanied with that of the cerebral organ during sleep, but unaccompanied with that of the medulla oblongata, may somnambulism be attributed.

60. *The several Conditions of Life.*—In conclusion, it may be observed, that the scale of animal life comprises three conditions of existence. First, the organic, or that going on in the capillary system, or structure analogous, as represented in vegetable existence, and dependent on chemical action; rendering chemical action the bond of union between organic and inanimate nature. Secondly, the nervous and sentient, dependent on the first, or the more particularly animal, and connected with organs of sense and volition. The third and last, surmounting the whole—the mental; on the summit of which man stands proudly pre-eminent, with a brain or cerebral organ developed or endowed in a ratio with his vast comprehension and superiority of mind above the rest of the animal creation; and holding communion with an immortal spirit, though in a way inconceivable by the limited number and capacity of the faculties with which it has been the pleasure of the Almighty to endow him.

61. *Health and Spirits, why influenced by atmospheric changes, and the condition of the air.*—From the foregoing considerations it will be obvious that the vigour of life, or active joyous health, must be to a great degree proportionate to the energy of the chemical action maintained, or the quantity of electricity—the actuating motive power—evolved in the capillary system. Hence it is that our feelings of health and spirits are so amenable at all times to atmospheric vicissitudes, and other causes influencing these chemical operations in the system: in common with the like manifestations of health or otherwise which may be observed at all times to attend atmospheric influence on the vegetable creation.

CHAPTER III.

OPERATION AND INFLUENCE OF THE VARIOUS AGENTS (AIR, TEMPERATURE, DIET, BEVERAGE, EXERCISE, SLEEP, AND MENTAL EMOTIONS) UPON THE BODY IN THE MAINTENANCE OF HEALTH OR THE PRODUCTION OF DISEASE.

62. HAVING thus explained the nature of life and health, and of the Functions and Structure of the numerous organs concerned in their maintenance, I shall now proceed to explain the action and influence of the various agents and elements operating upon the system for good or for evil—the maintenance of health or the production of disease. And first, those operating from without the system. Next, those received into the system, constituting and composing the blood. And lastly, I shall explain the influence of mental causes operating from within.

63. *The Air.*—The first in order will be the air of the atmosphere; an element, which, I may first observe, is of extensive influence, great importance, and of extremely variable character; inasmuch as, independently of its composition and its purity, it is subjected to a variety of causes of disturbance in its meteorological condition, which modify its influence upon the system, physically and chemically, for good or for evil, accordingly as the constitution of the individual, his condition of health, or general state, may be at the time.

64. *The Air's Composition.*—The composition, tempera-

ture, and humidity of the air, are the three principal conditions deserving attention; but others, as its electrical and barometrical states, will not escape notice. The atmosphere in its pure state, consists of two gases in a state of simple admixture—oxygen and nitrogen—in the relative proportions of one volume of the former to four of the latter.

65. *Impurities of the Air.*—The air contains also a variable proportion of carbonic acid gas—the gas evolved by the respiration of animals and the contaminating product of fermentation, decomposition, and combustion. The quantity of this gas usually present in the air does not exceed one part in a thousand, in which proportion it is inappreciable in its effects; but when this amount is much augmented, it becomes highly deleterious to animal life, as may be inferred from the fact, that a single inspiration of the undiluted gas is immediately destructive to life: hence we occasionally hear of persons being killed by exposure to this gas—the product of burning charcoal; as well as of others being suffocated by descending into cellars where beer or wine has been fermenting, or into wells, into which, being specifically heavier than atmospheric air, it is found to gravitate. The impurity of the air in crowded assemblies is owing principally to the presence of this gas, with which the air of the apartment becomes contaminated by the respiration of the persons assembled in it, each individual evolving from his lungs twenty-five cubic inches of this gas per minute, and further deteriorating the air by withdrawing from it during the same minute thirty-two cubic inches of oxygen, the preeminently vivifying constituent of the air.

66. The other constituent of the atmosphere, nitrogen, although it is not so conspicuously important, exists in a fourfold proportion, and nevertheless, I am of opinion, fulfils other purposes of great importance; although general opinion countenances the idea that it fulfils little else than

the very insignificant purpose of a simple diluent to its attendant one-fifth of oxygen. The combustion of the candles, gas, or oil, with which the apartment may be illuminated, is another and abundant source of contamination, of like character with that of respiration. Happily, however, heated air is rarified, and ascends to the ceiling accompanied with that which is heated and rendered impure by respiration, and drawing after it the cooler and purer air in its place. Were it not for this circumstance, from the generally imperfectly ventilated state of our churches and assembly-rooms, the lights would go out, and with this, life would be extinguished, for the want of the requisite supply of oxygen and the presence of this contaminating product of respiration, as was exemplified, in the analogous case of the party confined in the black-hole of Calcutta; in which case, from the want of ventilation, the air being admitted into the small apartment by two small windows only, out of one hundred and forty-six persons confined for ten hours, only twenty-three were found living.

68. *Ventilation.*—Experiments have proved that a man makes, on an average, twenty respirations in a minute, and at each respiration he inhales sixteen cubic inches of air, or three hundred and twenty in a minute; consuming during this period thirty-two inches of oxygen, and evolving in its place twenty-five of carbonic acid. The supply of air, for the ventilation to be perfect in any apartment, should therefore be in accordance with this necessity of our condition, or equivalent to this demand, which Dr. Reid, who has paid great attention to the subject, estimates at ten cubic feet per minute for each person present.

69. "Carbonic acid," Dr. Reid observes, "being the principal impurity communicated to air in all ordinary apartments, the amount present may in general be taken as an in-

dex of the state of the atmosphere and the efficiency of any ventilating arrangement. Any ordinary atmosphere containing one per cent. of carbonic acid, must be regarded as of very inferior quality and not fit to sustain health; though in numerous apartments a much more vitiated air may be discovered." He also observes, that a general reduction of strength and firmness both of mind and body, accompanied by an inferior appetite, invariably attends long and frequent continuance in an atmosphere so deteriorated.

70. *Malaria; its nature.*—Another gas with which the atmosphere is liable to become contaminated is the sulphuretted hydrogen, the most deleterious of all the known gases. Experiments upon animals have proved that an atmosphere containing less than a thousandth part of this gas is soon destructive of the life of the animal exposed to its influence; and a quantity so small as not to exceed one fifteen thousandth part has been known to produce injurious effects on the constitution. This gas, which is highly offensive to the smell, (as the odour of rotten eggs evinces,) and the carbonic acid, and some other compounds of carbon hydrogen and nitrogen, are the gases evolved by the decomposition or putrefactive fermentation of animal and vegetable substances, and which are eliminated from cess-pools, drains, ditches, churchyards, and the like—the abundant sources of disease. And as these are known to be the principal sources of malaria, it is reasonable to infer that these gases are the principal constituents of malaria. And as malaria is known to possess at times distinctive peculiarities in its effects upon the system, the variable admixture of these gases will explain, not only the general effects of malaria, but the particular or variety in the disease it may give rise to, taking also into account the constitution of the individual and the state of the system at the period of exposure.

71. The foregoing facts sufficiently explain the pernicious

effects of malaria upon the system. And as heat and moisture materially facilitate the decomposition of all organised substances, we accordingly find, that low situations and the often-flooded banks of rivers, ponds, marshes, or wherever vegetable or other organised substance is to be found in a state of decomposition, are also the prolific sources of malaria, and its consequence, fever; and especially so in hot climates or seasons. Vegetables stowed away in a damp cellar have often been known to cause fever; and sapulent wood received on shipboard, articles of food, or other animal or vegetable substance, as skins, horns, or the like, stowed in the damp hold of a ship—its own unseasoned frame-work or timbers not excepted—have all been known to produce the same pernicious effects. In hot climates, rice-grounds and jungle, or forests, are very productive sources of this most pernicious, or rather, I may say, when concentrated, truly poisonous agent; the effects of which I shall hereafter explain.

72. *Impure Air, the prolific Source of Disease.*—From what has been said, it will be seen how prolific must be the sources of malaria and disease supplied by the damp, crowded, unclean, and ill-ventilated cellars and apartments of the destitute poor. Of the rapidity with which the decomposition of animal substances, and their conversion into offensive and impure products, are effected, some idea may be formed from the offensive smell which most persons must have noticed ensues when a particle of meat has been retained for a few hours between the teeth. If we conjoin the conditions mentioned above, with cold, and insufficiency of nourishment, and often unwholesomeness in the kind of food itself, (and these are circumstances under which thousands of the destitute and suffering population of our cities exist,) we cannot be surprised that typhus, scarlatina, and a host of fevers, prevail,—to say

nothing of the numerous ailments of the stomach and bowels, dyspeptic and otherwise, which this cause (malaria) in a less concentrated degree, or under more favourable circumstances, gives rise to.

73. *The Nature of Air, or Gas.*—Having noticed the constitution of the air, the importance of its purity, and the evils attendant upon its contamination, I must next, in order that its operation and influence upon the system may be understood, endeavour to give a clear idea of the nature and constitution of aërial fluids, or gases. A gas may be understood as consisting of a solid ponderable substance, or base, in combination with caloric, or heat. Thus, ice, a solid in combination with a certain amount of heat, is converted into the fluid, water; augment the quantity of caloric, and it becomes an aërial fluid—vapour. This, at the temperature of boiling water, would remain permanently gaseous; but as the fire made use of for its production is extinguished, the caloric of the water's solution is gradually abstracted by the air and surrounding bodies, and the vapour is accordingly condensed, and, if the surrounding temperature exceeds 32 degrees of Fahrenheit's thermometrical scale, reverts into its former condition of water; or of ice, if it be below that point —the temperature of congelation; as we see exemplified at different seasons of the year in the production and fall of rain, hail, or snow, by the condensation of the vapour of the atmosphere, a certain amount of which is always in suspension by the air, at all temperatures.

74. *Of Combustion and the Development of Heat.*—Oxygen, nitrogen, hydrogen, and other gases,—or, in other words, the diffusive solutions in caloric of their respective ponderable elements—are permanently gaseous; but, for no other reason which we are aware of, than that we can make no direct reduction of their temperatures equal to their con-

solidation;—the earth, air, and everything around us, containing an amount of caloric which precludes the possibility of our doing so; that is to say, in the direct way; but indirectly, their disunion or separation may be readily accomplished; by presenting to the gas some body which has a greater affinity for the ponderable base than the latter has for caloric. For instance, melt a piece of lead in contact with the air; the lead at this temperature has such an affinity for the ponderable base of oxygen gas—one of the constituents of the air—that it immediately seizes upon it from the atmosphere, and the compound which is formed, now called an oxide of lead, is progressively converted into the crystalline substance of red-lead, and weighs double the amount of the lead employed. The caloric of the gas is necessarily disengaged and dissipated by the process. If, instead of lead, zinc is melted, the oxide which is formed by its union with the air, being a very light substance, is dissipated in the form of a white powder; and the combination, moreover, that takes place, is so sudden and intense, that it is attended with a vivid combustion; that is to say, the affinities, under these circumstances of temperature, are so strong between the oxygen and the zinc, that the calorie disengaged from the gas is so rapidly evolved and concentrated, that it assumes the visible form of light. This well illustrates the ordinary combustion of daily use. Carbon and hydrogen are the substances employed as fuel, as they exist in combination, as in oil, lamp-gas, or coal; or the first simply, as charcoal. These, when heated to the required degree, by first applying a little fire, immediately enter into rapid combination with the oxygen gas of the atmosphere, producing water and carbonic acid, and liberating their combined calorie, in the sensible state of light and heat; electricity, also, either as a constituent of the gas, or as another con-

dition of caloric, being at the same time evolved, as is testified by the experiments of M. Pouillet and Mr. Read, before noticed.

75. *The Air, the Source of Life and Heat.*—The office of the air in respiration, and the importance of oxygen in the system, will now be readily discerned. Oxygen and nitrogen, the constituents of the atmosphere, both enter the blood, as I have before explained, on inspiration. Carbon and hydrogen, the principal elementary constituents of the food, are contained also in the blood, received from the stomach and bowels; and with these the oxygen, contained in the blood, progressively combines,—producing, by their union, water and carbonic acid gas, and developing caloric and electricity. The other constituent of the atmosphere, nitrogen, enters into combination, though in much less quantity, with other of the elements of the blood during its circulation, developing, by its combination and consolidation with animal substance, of which it is an essential constituent, caloric, and probably electricity also; I say probably, as we have no experiment at present which proves this to be the case. I shall speak of the nitrogen of the food hereafter.

76. And thus the vital activity and temperature of the body are at all times maintained; that is to say, so long as respiration continues (food of course being also supplied); but arrest this, and life ceases. Hence it is that drowning, hanging, or suffocation, however induced—that is, the privation of oxygen, by cutting off the supply of air—is so immediately destructive of life. Respiration, however, as I have previously pointed out, is not confined to the office of the lungs, the skin performing also the same function, but not to the extent necessary to maintain the numerous actions essential to the existence of warm-blooded animals, although sufficient to maintain the torpid, hybernating state of some, during the winter season, as the snail, frog,

snake, tortoise, bat, dormouse, and some others; the phenomena of which I shall now explain, with some other conditions of life of an analogous character.

77. *The Hibernating State of Animals.*—The atmospheric temperature, by the withdrawing of the sun's influence in the autumn, is reduced below that degree which is compatible with the perfect action of the cutaneous and pulmonary capillaries of these animals. In the case of the dormouse, exposed to its influence—(every animal, I may here observe, having its own specific heat, or temperature, on which its functions are most efficiently or healthily performed; hence man, too, becomes benumbed and torpid with the cold;)—its functions in the exhalation of carbonic acid gas, and absorption of oxygen, are but imperfectly performed; and by consequence, the chemical changes in the blood connected with the evolution of caloric and electricity, are so much diminished, that the quantity of these generated is not equal to the excitement of the brain and the efficiency of the respiratory muscles; and hence the cessation of their actions, and the profound sleep which ensues. But as the temperature of these animals, by their timely withdrawing into holes and comparatively warm situations, is not reduced below that state which is compatible with a certain though limited degree of respiratory action being carried on by the cutaneous surface, organic or vegetative life is still continued. Hence, Spallanzani found that torpid animals, whose respiration, as far as the lungs were concerned, had ceased, carbonated the air in which they were confined.*

* This will very well explain how it is that frogs have been found imbedded in trees, and even in solid blocks of stone, for periods necessarily of incredible duration, and have been resuscitated on exposure to the air. It will be remembered that they have been thus incarcerated in their torpid state, the tree growing around them, having gradually, but perfectly, excluded them from the air's influence—the not only vitalizing, but the great destroy-

In this state of vegetative existence, or torpidity, they remain throughout the winter, (consuming their fat, which they have abundantly accumulated during the summer, and which is also a protection to them from the cold,) till the genial warmth of spring, increasing chemical action, augments the motive power; and with it the respiratory office of the lungs and the function of the brain are restored, when they proceed forth, resuscitated, in quest of food. The same is by analogy well illustrated in the vegetable kingdom, the warmth of spring expanding the sap, relaxing the cutaneous or barky surface, and thus facilitating atmospheric absorption, and the chemical processes of vegetable life,—and with this, secretion, and the budding and development of the leaf, or lungs; under the influence of which, the more complex actions of impregnation and fruition ensue, differing but little from animal reproduction. And conversely, thus it is with the fœtus in utero, like the hybernating animal; defectively oxygenated blood (for so it must be circulating in the fœtus, excluded from aërial influence, and renewing but a portion of its blood by an interchange with the mother,) is productive only of that quantity of electricity necessary to

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ing agent—leaving them, at the same time, immersed in an atmosphere of their own generation—carbonic acid—which is known to possess a high preserving power upon all animal, as well as vegetable, substances. And as frogs may be frozen, and subsequently restored to life by gradually thawing them—that is, restoring their blood to its fluidity and temperature—it requires no streteh of the imagination to suppose that they may be thus resuscitated by the vitalizing principle of the air, and warmth, when removed from incarceration, and their non-deteriorating localization; in short, from circumstances preeisely in character with the grains of eorn which have sometimes been found encased with the Egyptian mummy, and which have vegetated when they have been subsequently exposed to the essential influenees of the grain's vital development—air and moisture. In the case of the stone, they would have beeome suddenly inearcerated by a flood of sand; in the tree, the total exclusion of the air would be progressive, in which case they must have been supported during the period by the sap of the tree.

its formative development and vegetable existence, or state compatible with the non-performance of the respiratory action, and the numerous functions of animal life. Hence it is, that when its development and growth are complete, and by consequence, the quantity of electricity generated exceeds the necessities of its condition, excitement is communicated to its containing organ, the uterus, and its expulsion is effected; when respiratory action immediately follows, and with it animal existence. The fœtal state is strictly analogous to the condition of sleep in the advanced state of its existence—that is, after birth, or to the hybernating animal.

78. *Climate and Season.*—Reverting to our subject after so long a digression, the temperature of the air will be the next object of our attention, which will necessarily embrace some observations upon climate and season. I must first observe, that as every species of animal has its own particular temperature, we may fairly infer that this its specific heat is essential to the accomplishment and perfection of the chemical changes going on in its system, and to the well-being of the individual; as we see exemplified in the varieties of the vegetable creation, each genus being confined to the zones of temperature of different latitudes. Hence, as man's temperature, in common with that of many other animals, is ninety-eight degrees, how simple and beautiful the Almighty's law, whereby this degree of heat is equably maintained in the system, or nearly so, at all seasons of the year, and under every variety of temperature of climate! This equability of animal temperature is regulated simply by the density or rarity of the atmosphere attending the change in its thermometrical condition: cold condensing the air, and rendering it proportionably rich in oxygen, and thus respired, augmenting chemical action and the development of heat, and electricity or vitality, in the system; where, in a cold cli-

mate or season, from the increased abstraction of heat or radiation from the surface of the body, and the exertions necessary to man's maintenance and more abundant wants, they are more largely required. And the reverse of this in a hot climate, heat rarifying and attenuating the atmosphere, and thus proportionably diluting it, diminishing chemical action and combustion in the system—where, to maintain the proper temperature of the animal, the surrounding atmosphere and abstracting agents of heat, require that less should be developed; the surface at the same time being rendered likewise more conducting and radiating by perspiration. Or, in other words, it may be thus expressed:—to maintain the same temperature of the blood at all times and at all seasons, and under every variety of latitude and of climate, it must be obvious that the production of heat in the system must be in proportion to its radiation; and consequently, that when the body is surrounded with a warm atmosphere, the combustion or development of heat in the system must be proportionately diminished. Or the reverse of this must take place, as I have already explained. For, as a late writer justly observes, "As all bodies only give off heat in proportion to their excess of temperature, the human body being constantly at the temperature of ninety-eight degrees, nearly twice as much heat would be given off (if the body were freely exposed) when the surrounding air is at fifty degrees, as would be the case if the latter were raised to seventy degrees:" hence it is, that as we expend more of the fuel of the system (carbon and hydrogen,) in cold weather, our appetite is increased, and more food is required.

79. *Effects of Heat.*—It will be observed, that proportionate to the development of heat is the vitality or electrical excitement of the system. And hence from the diminished evolution of heat, and defective excitement, the debility experienced in hot weather. And from the same cause con-

joined with the excess of carbon, which is eliminated from the system in a proportionately less degree, and with which the blood becomes therefore often surcharged, the derangements of the bowels and liver, which so frequently take place in the summer season, as will be hereafter explained; or in hot climates, the diseases of these organs to which the European entering the tropics is so particularly liable. And in hot climates, as we see exemplified in India, from the continued operation of heat upon the natives—the less intensity of thought, the less bodily vigour, and the apathy of character of the people, compared with the inhabitants of more temperate climates.*

80. *Effects of Cold.*—Cold, on the contrary, I repeat, condenses the air, and accordingly affords a more abundant supply of oxygen to the system; and thus cold weather within a given range, adds vigour and spirits to the system. But on the contrary, when the temperature of the air is reduced below the point compatible with the function of the capillary vessels of the skin and lungs exposed to its influence, being effectively carried on, or in other words, where the system is robbed of its heat faster than it is generated, the chemical actions going on in the system are proportionately diminished or arrested, and torpor or debility of function of the organs, one and all, or disorder, ensues; or, in the extreme degree, death. Hence it is, that many aged and infirm persons, and young children, die in cold and

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* The experiments of Goodwyn, and more recently of Edwards, prove, that when an animal is placed in a cold medium, the quantity of air it carbonates in a given time is greater than when placed in a warm medium. Whence it follows, that in the country between the tropics, with a medium temperature of eighty degrees, the difference must be very considerable, seeing the quantity at fifty degrees was double that produced at the temperature of one hundred degrees in Goodwyn's experiments.

inclement seasons, even in the temperate climate of Great Britain.

81. *Most Congenial Temperature.*—The temperature of the air in England fluctuates during the year between twenty and eighty degrees: the mean of the year is about fifty degrees; between which and seventy degrees, according to the age and constitution of the individual, the temperature is most agreeable to the feelings of all, when it accordingly is the most healthy. Nature, with her usual providence, thus speaking out to all and each of us, endowing us with these sensibilities for our protection and guidance, our clothing, therefore, and the temperature of our habitations, should be at all times in accordance with her admonition; a comfortable feeling of warmth being the point to be aimed at.

82. *Humidity of Atmosphere.*—The humidity or hygrometrical state of the air is another condition which materially affects its influence on the system for good or for evil, and has much to do with our feelings as regards its temperature. This will accordingly be the next object of our attention; observing in the first instance, that a certain amount of moisture is at all times present in the air, and in a limited degree is essential to the well-being of the pulmonary and cutaneous surfaces exposed to its influence; a deficiency in this amount, or excess of dryness of the air, robbing them of their humidity, and occasioning dryness and constriction of the skin, the throat, and nostrils, and thus in some instances cough, sore throat, &c.—Surrounded, however, as England is by the ocean, the atmosphere of our island seldom becomes too dry, but on the contrary, dampness or saturation with moisture from the prevalence of westerly winds, which sweep in their course over the Atlantic Ocean, is a frequent condition. This damp state, if conjoined with heat, (or "mugginess," as it is called,) we find depressive of the energies of the system. This is strikingly exemplified

in the horse, which, as the reader may have observed, or as every stage-coachman can tell him, in this state of the weather soon sweats, and is incapable of performing half of its ordinary duty. And why so? For these several reasons:—the air, when saturated with moisture, is too perfect a conductor of electricity, and accordingly robs the system too fast and too abundantly of its produce. This is exemplified by the ordinary electrical machine: in damp weather the electricity produced by the machine cannot be concentrated or retained on the conductor and in other glass vessels used for this purpose. And again, as this state of the air is always accompanied by a low barometer, there is not the usual support or incumbent sustaining pressure of the air on the surface of the body; and in consequence, the blood is not returned so freely as it should be to the heart, nor is so much air imbibed—the pressure from without, or the power which impels both the one and the other into the system to the vacuum formed by the heart's dilatation, being proportionately reduced; and hence, too, would exhalation from the surface be increased at the expense of the air's absorption, and thus the perspiration which so readily ensues on exertion; to say nothing of the evaporation and radiation from the surfaces, which also are both diminished, the latter being at all times proportionate to the low temperature, and the former to the dryness of the air.

83. *Raw State of Atmosphere.*—Humidity of atmosphere conjoined with cold (or "rawness," as it is usually called) is a state still more objectionable, inasmuch as it robs the system not only of its electricity but of its heat also. Hence it is in the highest degree liable to torpify or arrest the cuticular and perspirable, or the pulmonary and respirable functions, (to the capillary vessels of which surfaces it is immediately applied); giving rise to irritation or inflammation of these organs as well as of more deep-seated parts, which may

be also thus influenced, and characterised by the symptoms of cough, colds, sore throat, rheumatism and fever, as well as occasioning many other disorders of an inflammatory kind, which will be hereafter pointed out and explained.

84. *Atmospheric Pressure.*—To what has been said above on the density of the atmosphere, it may be added, that the mean pressure of the air upon the body, is, as marked by the column of quicksilver in the barometer standing at thirty inches, fifteen pounds upon every square inch of surface, operating also within upon the lungs as well as without. The sustaining power and pressure of the atmosphere is estimated as amounting to not less than thirty thousand pounds weight upon the whole surface of the body.

85. *Effects arising from a low State of the Barometer.*—Dr. Reid justly observes, "Every variation from the ordinary range of density to which the body is subjected, must necessarily induce peculiarities of tension throughout the system, and affect more especially the cells of the lungs, the pores of the skin, and the cavity of the cranium. It cannot be questioned that some of the sensations which are familiar to every constitution, but more particularly to invalid and nervous persons, and which are dependent on a change of weather, are more peculiarly associated with a rise or fall in the barometer. In asthmatic cases, this may be particularly noticed. The tendency to exhalation from the surface, and amount of expansion in all the more compressible tissues, must unquestionably increase with the fall of the barometer. The amount of air supplied to the blood in the lungs must obviously vary at each inspiration, according to the density of the air inspired." Dr. Reid further observes, "But the influence of a variation in the height of the barometer, is perhaps more familiarly known by its effects upon stagnant pools and marshes, and all materials loaded with gaseous products, whether formed by putrefac-

tion or other proeess. The effluvia from drains and marshes, and the fire-damp of mines, may be taken as well-known examples of matters subjeet to such changes. If these be in a great measure pent up by the pressure of the atmosphere, in those bodies from whieh they are diseharged, the amount evolved being eomparatively trifling, a sudden fall of the barometer immediately eauses their liberation, which is mueh more exeessive at first than afterwards, as the amount dissipates. The influenee of the pressure of the atmosphere is aeeordingly most important in low, eonfined, and marshy situations, subject to unwholesome exhalations."

86. *Most healthy State of Atmosphere.*—When the barometer is below thirty inches, and the air proportionately expanded, the effeets are, as I have already pointed out, in the same ratio, debilitating. And on the contrary, when the barometer exceeds the mean of thirty inehes, whieh in general is indieative of fine weather, the air is proportionately eondensed and moderately dry at the same time, affording not only a more abundant supply of oxygen to the system, and its eonsequenee, electrieity, but likewise preventing the dissipation of the latter: aecordingly it is now in a condition the most favourable to health; and especially so, when aecompanied (which it mostly is) with a serene atmosphere and a medium temperature; which, by general eonsent, is reeognised as fine wholesome weather, being grateful to the feelings, and produeing a sense of lightness and joyousness of spirit—the distinetive attributes of health.

87. *Electrical Conditions of the Atmosphere.*—In relation to the electrieal eondition of the air (the air at all times eontaining a eertain amount of free electrieity) as an influeneing ageney upon the system, we know but little; much will nevertheless suggest itself to us, from what we do know of peeuliar eleetrical states of the air, influeneing other chemical operations of nature, of analogous import with those

which take place in the blood and animal system ; for instance, the change in the electrical condition of the air attending a thunder-storm, addling eggs, and thus destroying their vital capabilities ; the same electrical condition and influence of atmosphere subverting and arresting the process of fermentation ; under circumstances in both cases, however, of particular exposure to its influence. Fish in ponds, it is said, are in some cases killed by the same agency. These are cases which may be mentioned in illustration, which from their importance and analogy with the chemical operations going on in the animal system, lead to the inference, that a negative, or suddenly altered condition of the electrical state of the atmosphere, in relation to that of the system, and to the chemical changes taking place in the blood, may be in reality an agent of no mean importance, and especially so in giving rise to variety in, or modifying, many diseases of general or epidemic influence.

88. *The Effects of various Winds.*—The force of the wind, as well as the direction of the current, or point of the compass from which the air blows, are also circumstances not undeserving notice. The force or rapid current of the wind materially modifies the effect of temperature upon the system, as all of us sensibly experience. Captain Parry mentions, in the account of his Arctic expedition, that with the thermometer twenty degrees below zero his men could go about freely if the air was calm ; but with a wind, they dared not venture to move from the ship, with the thermometer twenty or more degrees higher, the effect was so chilling. The cause of this is obvious ; the cold particles of the air being brought in contact in such rapid succession with the body, the latter is deprived of its heat faster than it is generated ; like a person putting on a constant succession of cold shirts, instead of continuing in one, which duly becomes warm.

The influenee of particular winds or currents of air must neeessarily bear reference to eaeh particular plaee or loeality, with referenee to surrounding and often very distant causes; malarious impregnation and blight, as well as insects, sand, and ashes, being known to be thus carried to incredible distanees.

89. An easterly wind to us in England is in general cold and dry; and in the spring insalubrious and blighty, from the great extent of eontinent over whieh it has passed, and the malarious exhalations and other terrestrial emanations which it has imbibed in sweeping aeross the marshes of the Netherlands and the Low Countries. The wind from the west is pure, and when not too humid from the vapour of the Atlantic, (whieh it is too apt to be in our western eounties—and henee the relaxing character of the elimate of Cornwall and South Devon in particular,) it is soft, balmy, and eongenial to health. The wind from the Arctic region of the north is eold and bleak. That from the south, on the other hand, is in general warm and moderately dry.

90. *Soil, Elevation, and Sun's Influence.*—To these brief general observations I must now add a few others, on the influenee of the more immediate surrounding causes affeeting the air and the salubrity of the atmosphere;—as soil, elevation, exposure to the wind and to the sun's rays, and so forth. With respeet to the first, a gravelly or ehalky substratum of soil is mueh to be preferred, its porosity not admitting of puddles being formed, or accumulations of water to take plaee upon the surfaee, favouring both the development of vegetation and also its decay, and consequent damp and malarious exhalations.—With respeet to elevation, the source of the air's deterioration being the earth's surfaee, the more we aseend, or the higher we are elevated above the general surfaee of the surrounding eountry, the purer neeessarily must be the air we breathe, and in most eases also

the freer from damp. Elevation of site, therefore, provided it is not too much exposed to the influence of the bleak winds from the north and east, nor exposed to surrounding malarious influence, is certainly the most salubrious.—Lastly, as respects the sun's influence, it is well known, that independently of its genial influence upon the earth and upon vegetation, light has also an important effect for good upon the animal system. A shaded and obscure habitation is therefore decidedly objectionable.

91. *The Blood; its Elementary Constituents, whence derived.*—Having at length completed our observations on the air, in reference to its effects, local and general, chemical and physical, upon the system, the next subject of our inquiry is the constitution of the blood, in relation to the other elements, solid and fluid, entering into its composition, and derived from the stomach and bowels;—an inquiry which necessarily embraces, in the first place, the subject of diet. In treating of this subject, it may first be observed, that the composition of animal bodies and man's structure may be resolved into a few simple primary elements, namely, carbon, hydrogen, oxygen, and nitrogen. These, therefore, are the rudimentary and essential constituents of all dietary substances; the lime of bones, which I have omitted, being principally derived from his fluid sustenance—water, which contains at all times a very notable quantity of that substance.

92. Besides these purposes of structural nutrition and endowment, however, there are others to be fulfilled by diet of no less importance in the system—namely, those of combustion and vitalization; and these accordingly, like the oil of the lamp and coal in the grate, furnished for the production of light and heat, require renovation; the elements of which, carbon and hydrogen, being for these purposes required in both cases. As these abound, and constitute, in combination

with another element, oxygen, the principal constituents of every vegetable substance, Nature has abundantly provided man, for his sustenance, with three of the elements of his structure and vitality; and the fourth, nitrogen, although not an essential element of vegetable substance, nevertheless enters sparingly into the composition of most dietary substances used by man, and especially abounds in the grain of wheat; although the air he breathes is doubtless the principal source from which man and animals in general derive it. In ruminating animals, or those which chew the cud, the re-mastication of the food, and its second exposure to the air, may have, as one of its objects, its combination with an additional amount of nitrogen, and perhaps of oxygen also at the same time.

93. In addition to the four elements named, of which animal substance is essentially composed, there are other substances which, in minute quantities, enter into the composition of the blood, as soda, salt, iron, lime, sulphur, and phosphorus; but which are all derived from the same sources of animal nutriment, namely, vegetable food and water; and doubtless are to a certain degree essential to animal organization, although not fulfilling so prominent a part as the elements before mentioned.

94. *The Proximate Principles of Animal Nutrition.*—The first four, however, namely, carbon, hydrogen, oxygen, and nitrogen—in combination with one another in certain proportions, according to certain laws of chemical affinity, produce in vegetable growth the immediate or proximate principles of animal nutrition—namely, starch, sugar, oil, and albumen; and as all these, as Dr. Prout justly observes, unite in the composition of milk, milk may be assumed as the type of a perfect aliment, and it is accordingly that provided by nature for the young of all animals of analogous conformation with man. And as these elements exist com-

bined in the form of protein, it is said by Liebig, in vegetable substances even in closer approximation to animal structure than those we have already named, (starch, oil, and the like,) this protein being received into the blood as a constituent of vegetable food or of animal substance, in the composition of which it is said to be the essential constituent,—the organization during its circulation has only to combine with it, or re-arrange it in accordance with the requirements of the tissues, or as the exigences of the system may require.

95. *The Blood's Purification.*—The other constituents of the food, as well as the debris of the old structures of the system, or worn-out particles, which become absorbed during the course of the blood's circulation, being combusted by their union with the oxygen absorbed from the atmosphere, are expelled from the lungs and skin, or, entering into other combinations, are eliminated from the blood by the various secretive organs, the liver and kidneys more particularly, and expelled with their excretions from the system.

96. *Vegetation, the primary link of Animal Structure.*—Thus the task, as Dr. Prout justly observes, of forming the proximate principles of the blood of animals, is left to plants; which, I may add, as life-possessing bodies, are endowed with the capacity of collecting, combining, and transforming the impurities of the air, and the foulness of the dung-hill, into the fragrance of the rose, the deliciousness of the peach, and the nourishment of wheat-corn for man's use; and, by a higher state of vitality with which man's system, in common with the rest of the animal creation, is endowed, in due course, has the power further to transform them into his own substance.

97. *Man's Omnivorous Character: the Laws of Nature his Rule of Diet.*—The vegetable creation alone, conjoined

with the air, it may be observed, abounds in all the essential elements of animal nutrition, and man's structure; but Nature, in her bounty to man, and in order that his race should be the inhabitants of the whole earth, has not confined his diet to vegetables alone, but has given him the power also of converting the substance of other animals into his own kind; and we accordingly find his teeth and stomach adapted to this omnivorous condition of his creation. Hence the inhabitants of the higher latitudes and polar regions, where vegetation is limited, by the short period of the sun's genial influence, to a few months of the year, animal substance is man's almost exclusive diet. In tropical regions, on the other hand, man's diet is as almost exclusively vegetable. In the intermediate and temperate zones of the earth's surface, again, man's diet is of a mixed kind, consisting of both animal and vegetable substances. With these facts before us, a practical inference may be fairly deduced; which is, that in the colder seasons of our own climate, man's diet should consist more largely of animal, and in the summer of vegetable kind; which accords, not only with our desires and appetites, but likewise with the productions of the season.

98. *The dictates of Appetite and Common Sense enjoined as Man's Rule of Diet.*—And further, I would observe, seeing that Nature has given to all animals the faculty of discrimination and selection of what is good and best for the sustenance of each kind respectively, it may be also inferred, that an endowment so essential to the well-being of his nature, has not been withheld from man by his provident Creator; and that, accordingly, he may be left safely to the guidance of his desires, and to the intuition which is natural to him, to have recourse to such articles of diet as best accords with his appetite and necessities at the time being, without rule from any one as to kind; but with this reserva-

tion, that moderation as to quantity be at all times observed, and no incongruity be admitted of as to admixture; though variety may be very properly recommended at suitable intervals. It is, however, to be observed, that in according so great a latitude, I am distinctly to be understood as confining my observations to dietary substances of a simple kind, excluding necessarily the ten thousand and one heterogeneous compounds which the artificial habits and vicious propensities of our social system have introduced into use.

99. *Quantity of Food required dependent on Season and Exercise.*—Before dismissing the subject of diet, I must be permitted to add, for the information of those who desire to know the amount of aliment essentially necessary for man's sustenance, (as much error prevails on this head, some persons fancying they cannot take too small a quantity, and others, on the contrary, thinking they cannot eat too much,) that, to maintain the strength and weight of the body, the quantity must at all times bear reference to the exercise of the muscular system, and consequent expenditure of nervous power and combustible elements of the blood, or the exertions of a physical kind more particularly required of the individual. Experiments of a direct kind have established beyond doubt, that the expenditure of carbon in the system, evolved from the lungs as carbonic acid gas, bears a direct proportion to the increased frequency and amount of respiration called into action by physical exertion, and called into action necessarily to maintain an increased expenditure of power. An increased quantity of food to support this is accordingly required; and if this is not furnished, it will be derived from the absorption of the fat of the system, or, if this is not available, the disintegration of some of the structural tissues of the body. Fat, be it observed, is in reality no part of the structure, but a deposition between the textures, like honey in its comb, or store of

nourishment, to be employed in this way on every occasion of necessity, or privation of food; and provided more especially for the uninterrupted maintenance of the combustion and vitality of the system. In short, it must be obvious, that were it not for a provision of this kind, the all-consuming fire within, resulting from the inspiration of oxygen, would destroy us on any trivial disease of the digestive organs taking place, by which the necessary supply of fuel, or sustenance, should be interrupted. In this manner is the vitality of the dormouse, and other hybernating animals, maintained—that is, by the fat which they accumulate in the summer season, and which serves them as fuel, or food, during their state of torpidity; and with which being thus further clothed as with a garment, when they retire into their hiding-places they are less readily deprived of their heat, and thus is their temperature maintained.

100. To revert to our subject: With passive exercise, or that involving no great muscular exertion, a man, it has been estimated, will require, to maintain his strength, from ten to twelve ounces of solid carbon daily: his food must therefore be in proportion to this necessity of his existence, and the quantity of the whole, or one or other of each kind of the substances named, must therefore bear reference to the amount of carbon contained in each respectively; of which the subjoined table will give a pretty accurate idea.* If much exertion be required of the individual, the quantity must be proportionably increased—say to fourteen or sixteen ounces. It is obvious, therefore, that a man's diet can in

* The diet of our soldiery offers a pretty fair estimate of what is required in this country. A finer body of men is certainly not to be found in Europe. Their daily rations consist of ¾lb. of meat, including fat and bone, and 1lb. of bread: to which they add one penny for vegetables—(say 1½lb. of potatoes on an average)—and purchase generally butter or bacon to the amount of about two ounces each. They drink a pint of beer daily. The whole will be found unitedly to contain a trifle less than twelve ounces of carbon.

no case be a constant quantity, but must fluctuate with the season of the year, and the exercise taken by the individual. This table exhibits the proportion of carbon contained in one hundred parts of the principal alimentary substances employed by man :—

	per cent.		
Raw flesh, without fat or bone, either of fowl or beast	14	say	$\frac{1}{7}$th part.
Cooked meat (as it contains some fat)	20	,,	$\frac{1}{5}$,,
Fish	15	,,	$\frac{1}{7}$,,
Fat, bacon, lard, &c.	80	,,	$\frac{8}{10}$,,
Eggs	40	,,	$\frac{2}{5}$,,
Cheese	40	,,	$\frac{2}{5}$,,
Butter	70	,,	$\frac{2}{3}$,,
Milk	10	,,	$\frac{1}{10}$,,
Bread (stale)	30	,,	$\frac{1}{3}$,,
Flour, oatmeal	40	,,	$\frac{2}{5}$,,
Starch, arrow-root, tapioca, &c.	44	,,	$\frac{2}{5}$,,
Sugar	42	,,	$\frac{2}{5}$,,
Rice	40	,,	$\frac{2}{5}$,,
Potatoes	12	,,	$\frac{1}{8}$,,
Fruit	12	,,	$\frac{1}{8}$,,
Vegetables, in common	10	,,	$\frac{1}{10}$,,

101. *The Nutritive Qualities of Animal Food.*—The principal constituent of vegetable food is carbon. Of wheaten bread (divested of every particle of moisture) it will have been observed, thirty per cent. of its weight consists of carbon, with which is combined about two per cent. of nitrogen. Dry muscular substance—the flesh of meat—contains fifty-four per cent. of carbon in combination with fifteen of nitrogen. Raw fresh meat, as it contains in combination a threefold weight of water, possesses fourteen of carbon and four of nitrogen To the latter constituent have its more nutritive qualities been ascribed: but this I believe to be true only in part; its more nutritive quality I would rather attribute to the existence of these elements in the required proportions, and in combination also with other essential constituents of the blood, and to the facility of its mutation also, or its con-

version by the assimilating organs into blood;—blood, indeed, being nothing less, and but little more, than fluid flesh!—its composition consisting of fifty-two carbon, seven hydrogen, fifteen nitrogen, twenty-one oxygen.

102. *Nitrogen the characteristic Element of Flesh; whence derived.*—From what has been said, it will now be readily seen why the pig in the sty, superabundantly fed, becomes enormously fat; whereas the wild hog, who roams the forest in search of his food, in common with other wild animals, is as proportionably muscular and as free from fat. The essential difference between muscle (flesh) and fat, is, the addition to the elements of fat of the other constituent of muscle—namely, nitrogen, which is accordingly received from the air by a more active respiration—which with the conjoined increased exercise of the muscular system, and more vigorous circulation of the blood which accompanies it, would appear to be necessary to effect the combination of the nitrogen with the other elements of animal substance; and thus the muscularity of the labouring man, who feeds almost exclusively on vegetable diet, compared with the delicate female, who takes but little exercise, and whose diet often consists principally of animal substance, and who perhaps from this cause, and her sedentary habits, more particularly requires to be thus supported. Hence muscular development—muscle being the instrument of motion and consequently of strength—is proportionate to the exercise taken, (and thus do the arms of the smith, and the shoulders and legs of the porter, become so largely developed,) and not to the capacity of the chest, although this doubtless is a favourable concomitant circumstance. How beautiful a law of our nature is this!—whereby the strength of the individual is proportionate to the requirements of his condition. Animal food no doubt tends to the more perfect nutrition of the system—being replete with all the elements of its structure, and in a condition more readily assimilated, and

available to the exigcnees of the system; and no doubt from this eause the same bulk of animal food is more nutritive than an equal quantity of vegetable food. Fat, however, is eertainly the most conecntrated form of nourishmcnt, both respiratory and structural; but as this contains no nitrogen, and requires an aetive condition of the digestive organs for its assimilation, active exercise is an essential condition to its mutation, and is accordingly adapted to the labouring classes, who use it as bacon and lard, as a principal constituent of their food. The superiority in flavour of the Welsh, South-down, and Seotch mutton, like the flesh of wild animals, is due, I have no doubt, to the cireumstanee of these animals having to roam far and feeding upon a seanty herbage—developing thereby the most exalted degree of animalization, museular substance instead of fat. Fat abounds in the Leicester sheep fed on the richer plains or in an abundant pasture, as well as in the stall-fed ox. Thus fat may be said to be musele, minus this element of the air—nitrogen; an idea, if not an absolute fact, well supported in the eircumstanee, that musele may be and is thus converted, after a time, into adipocere—a fatty substanee found in our burial-grounds; flesh becoming thus transformed, during the period of its interment, by parting with its nitrogen by gaseous exhalation.*

* It will be observed, that I have assumed that the nitrogen of flesh is derived from the air. I do so most eertainly; the amount furnished as a eonstituent of vegetable substances can never supply the amount required. It exists in vegetables to the extent, upon an average, of little more than one per cent.; and this, I maintain, is no essential eonstituent of the vegetable structure, seeing that the quantity in grain is variable, and dependent upon the nature of the soil and the manure employed; and I should therefore say, extraneous rather than essential; for sugar, stareh, and the essential products of vegetation, consist of elements in definite proportions at all times, and without nitrogen. But, setting this view aside, the argument may be much better maintained by a simple consideration of the acknowledged fact, that

103. *Water an essential Constituent of the Blood.*—Another essential constituent of the blood, and of animal sustenance, is water. It constitutes no less than four fifths of the weight of the blood, and enters in an equal proportion, or nearly so, into all its products, (more than three fourths of the weight of flesh and muscle consisting of water,) bone being, perhaps alone, excepted. Water, thus constituting so large a proportion of animal bodies, is the medium not only of nutrition—giving fluidity to the blood by which it is circulated—but that also by which all other vital actions are performed. Surrounded as animal bodies are by an atmosphere colder and drier than themselves, the quantity of water they contain, as Dr. Prout justly observes, is liable to perpetual changes. Accordingly, we find that aqueous vapour is freely

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nitrogen constitutes no less than four fifths of the atmosphere; and Nature, be assured, in her economy of means, never designed it to fulfil the insignificant purpose of simply diluting the remaining one-fifth of oxygen, to which is justly attached so much importance in the animal economy. Animal vitality is acknowledged to be derived from the air we breathe; and as experiments prove that life cannot be maintained but for a very short period by the inhalation of oxygen alone, it is clear to my mind that it must fulfil some very important purpose. I know, when oxygen has been respired, it is said that the animal dies from excess of excitement; but this is mere assertion—there is no evidence of any unusual excitement; but, on the contrary, let the animal respire the protoxide of nitrogen, and what is the case then? Great excitement follows—more than is commensurate with the increased amount of oxygen entering into the composition of this gas, and its solubility in the blood. How is this to be explained, I would ask, if not arising from the nitrogen which constitutes so large a proportion of its composition, and which exists in this compound, in a condition more amenable to combination with, and a higher degree of, the blood's vitalization? The excretions of a labouring man, with a well-developed muscular frame, living almost exclusively, in the agricultural districts, upon vegetable food, must contain nitrogen in an amount exceeding that contained in his food. And look at the elephant—whence is this mass of flesh derived? Fish and leeches kept in glass vessels of pure water, not only live, but increase in weight and size: now, as nitrogen is an abundant constituent of their structure, whence can it be derived, but from the air which exists in combination with the water?

exhaled from the body, being evaporated by the agency of our inward heat, and passes off from the skin and lungs: it is also, under particular circumstances of privation, as freely absorbed from the atmosphere by the same organs; thus we read of a jockey, who had been sweated down and reduced in weight by abstinence and exercise, acquiring, after drinking a single glass of wine, not less than three pounds additional weight, which could have been only derived from the atmosphere. It has been determined by experiment that, under ordinary circumstances, nearly three pounds are lost, or exhaled from the skin and lungs, daily; in addition to what is excreted and passes from the system in the form of urine, which amounts to about two pints upon an average during the same period. A proportionate quantity of fluid beverage must accordingly be supplied to the system.

103[2]. *Man's proper Beverage.*—I am led, in the last place, to observe, that the only essential beverage for man, as for the rest of the animal creation, is water; that this is the most simple and natural, the most wholesome and (all will admit) the most abundant drink; that beer, or wine, and all other spirituous and exciting beverages in too common use amongst mankind, are the perversions of our social habits and of the Almighty's gifts from the purposes to which they should be confined, namely, as occasional cordials and renovators of the system, under enervation (that is, a defective supply of electro-nervous power) or exhaustion.

104. *Spirituous Beverages; their Nature and Operation.*—After what I have said in condemnation of the habitual use of spirituous beverages, I am perhaps bound to give, in support of my opinion, an explanation of their operation on the system. Their effects as excitants are well known to every one, but the *quo modo* of their operation is the subject to be explained. There are two modes in which they may operate: one, the direct influence of their absorption into the

blood, and stimulating operation on the various organs and structures with which they are brought into immediate contact during their circulation through the system; and the other, founded upon the constitution or elementary composition of alcohol—the essential constituent of all spirituous or fermented fluids—whether beer, cider, wine, gin, or what else. Spirits contain upon an average fifty per cent. of alcohol, wine twenty, and good beer about eight; alcohol consisting of carbon and hydrogen in the relative proportions of twenty-four to thirty-six, with twelve of oxygen. Now, from the known affinity these elements (carbon and hydrogen) have for oxygen, and supposing them to exist in alcohol in a looser state of combination (that is, with a greater affinity for oxygen) than that in which the same elements are united or exist in the blood as constituents of the food, we may fairly conclude that when received into the blood in the form of alcohol, as wine, or the like, they would unite with the oxygen of the air existing in the blood in its free state, and a more speedy and active combination would ensue, producing the usual effects of such beverages upon the system, namely, increased excitement. In confirmation of these views, it is mentioned by Dr. Paris, that Mr. Spalding consumed the oxygen of the air in his diving-bell much sooner when he drank spirituous liquors and employed an animal diet than when he drank only water and lived on vegetables. But however unobjectionable this may at the first glance appear, let it be remembered that this combination takes place at the expense of the oxygen which was intended to enter into certain other combinations with the constituents of the blood in fulfilling the purposes of nutrition, and for the disintegration and combustion of the deteriorated and exhausted particles of the system which should be expelled; the retention of which alone in the blood would, in many cases, be productive of disease, as we know gout to arise from some cause of this

kind. Independently of the enervation which must succeed to undue stimulation, exhaustion in all cases succeeds and is equivalent to the previous excitement of the system; and hence the fact, that one glass of wine begets the necessity for a second; and the feelings of necessity which follow the habitual use of stimulating beverages. These are the objections I have to urge against the practice of their habitual use, believing that alcohol operates on the system in both the modes mentioned; though as an occasional cordial in certain conditions of the system, and as a medicine, alcohol, in the shape of wine, beer, and the like, may be justly recommended as a most useful excitant and restorative of nervous power.

105. *Exercise.*—Confining our views at present to physical exercise in contradistinction to that of the mind, or intellectual exercise (of which we shall speak hereafter), I may here briefly observe, (having already explained the operation of exercise of the muscular system, by the increased vigour of the heart and the respiratory action it gives rise to, in augmenting the temperature and vitality as well as muscular development or strength of the system,) that exercise is an agent of much importance in relation not only to the efficient performance of the functions, and therefore the health of the system in general, but also in the cure of disease. Thus, as the immortal Swedenborg justly observes, "Affections of the system in general tend either to repair life or threaten death; they induce either heat and activity or cold and inertia; and hence we have various changes produced in the vessels or fibres constituting the organic textures, which changes, speaking generally, are expansion or contraction; extension or retraction; induration or softening;—the effects of which in the sensorial organs, are, either acuteness or dulness; and in the motorial organs, either activity or torpor."

I say, if these be facts, (which they indubitably are,) how

all-important must exercise be to the mental organ as well as to bodily health; seeing the direct power it possesses of increasing both heat and activity—the temperature and vitality of the system.

106. *Sleep and Waking; how induced.*—Having already offered some explanation of the cause and nature of sleep, as well as of some of its vagaries and attendant phenomena—as dreams, somnambulism, &c.—I shall now more particularly explain how sleep, under ordinary circumstances, is induced. I must first observe, that the actuating or motive power of our existence—electricity—is, as I have already explained, derived from the air by its combination with the elements of the blood; it must therefore be proportionate at all times in amount to the quantity of air imbibed by the skin and lungs. During sleep, the organs of voluntary motion as well as those of the senses and mind, being in a state of repose or inertia, the involuntary or vital organs—the heart, the digestive organs and their associates, including also those of the generative function in the more active periods of our existence—gradually accumulate power (hence the *signum salutis*—the *lion rampant*—the *cock-crowing* of the morning) until the quantity exceeds the necessities of their condition—when wakefulness is induced; that is to say, the motive or actuating power is extended to the sensorial and mental organs, exciting them, as it now does, to the renewed activity of wakefulness and animal existence. We are accordingly impelled by the excitement of these organs to exertion,—if not in all cases, like the rest of the creation, to obtain the food necessary for the maintenance of existence (the decree of our nature, and rendered imperative upon all by the feelings of appetite),—at least, to action of some kind, mental or bodily; for the mind and its associates, the senses, are in despite of us unceasingly and ever in action, in thought, or volition. And as action

of some kind thus continues throughout the day, it ultimately expends all surplus power, or quantity exceeding what is indispensable to the maintenance of the more immediately vital or involuntary actions of life: and when this takes place, the heart in its power of circulation becomes enfeebled, and the quantity of blood circulating to the brain and to the lungs is necessarily diminished. From the first cause, diminished electrical evolution takes place, and the brain's power is lessened, and consequently also the action of the respiratory muscles, which are derived from this source, (hence the yawning which ensues,) from which cause, united with the diminished circulation in the lungs, their functions become in an eminent degree lessened. And as the functions of these organs in respiration are twofold, being not only the absorption of the actuating principle—oxygen, but the extrication from the blood of carbonic acid also, (a highly deleterious narcotic principle when abounding in the blood,) the presence of this, united in effect with the deficieney of the other (oxygen), operates conjointly to diminish all the functions; when finally, as secondary to all the rest of the functions of the system, by defect of nervous excitement, abeyance of the sensorial and mental functions—or sleep—is induced. This is necessarily more or less perfect, in proportion generally to the expenditure of power and exercise of the previous day, and of the muscular system in particular—which withdraws it from the brain, and therefore relieves that organ from any undue excitement, which otherwise in thought often prevents its repose. The tendency to sleep in fat people is in like manner induced by the reduction of the respiratory functions—the fat located about the kidneys and the heart preventing the descent of the diaphragm and the full expansion of the lungs; and especially so when the stomach is distended by a full meal, which further withdraws electrical excitement from the respiratory to the fulfilment

of the digestive process. The prototype of sleep is furnished, or exactly represented to us, in the hybernating condition of some animals; and illustrated also in the condition of the fœtus in utero, as I have elsewhere pointed out.

107. *Mental Exercise and the Influence of Moral Causes on the System.*—The fund of cleetro-nervous or actuating motive power, it will be remembered, is a limited quantity, proportionate at all times to the perfeetion of the chemieal changes going on in the blood and the eonsequent action of the capillary vessels,—effeets though simple in their nature, yet essentially dependent upon the effieient performance of the more eomplex and elaborate funetions of the several organs eoncerned and associated in the processes of the formation and perfeetion of the blood—viz., respiration, digestion, assimilation, eireulation, and secretion. And as the performance of these several functions is dependent upon an efficient supply of nervous power, it is obvious that as an available power for other purposes, this fund must necessarily fluctuate constantly in amount, and be at all times limited to the quantity over and above that required for the exeitement of these functions, whieh is indispensable to the life and health of the system. Hence it is, that at one time we are eapable of any undertaking, mental or bodily; and at another time fit, as it is usual to say on such oecasions, —absolutely fit for nothing.

108. *The Joyousness of Youth.*—The joyous and extatie feelings of health experienced by youth more espeeially, when the mind is free from eare, we may presume, therefore, is eonneeted with an abundant exehequer—an overflowing income of nervous power. And on the other hand, the sense of lassitude and inertia at other times felt, must be attributed to a proportionate deficiency of this fund.

109. *The Brain and Stomach antagonist Organs.*—The

brain, in its office of thought and of the various intellectual functions, must in its exercise, therefore, stand in the relation of an agent antagonist to the efficient performance of the functions before enumerated, and which, from their essential importance to animal existence, are emphatically called the vital functions. And thus it is, that care and anxiety, or the undue exercise of the passions, by the expenditure which they occasion of this power, are so wearing to the energies of the system, and accordingly destructive to health. And, for the same reason, extreme fright, sudden joy, or the like excessive perturbation of the mind, is occasionally attended with immediate death—the sudden arrest of nervous power and of the functions of these all-important organs being the occasion of this result. And again, on the contrary, as I have elsewhere observed, the cause why "fat paunches have but too frequently lean pates," is clearly attributable to too large a quantity of this nervous power being thus engaged in the stomach and associated organs. Mr. Cunningham observes,—"Indeed a thinking man is at all times an unsteady walker, being liable to trip at every stone, or to be pitched off his perpendicular by even the slightest push, from having less electricity in his heels than in his head; while the less thoughtful trips nimbly along without a stumble, from there being more electricity in the former than in the latter." The amount of this fund of electro-nervous power, and man's income of it in the ordinary circumstances of health, are no doubt equal to all the real necessities of his condition: thus all that is required of him is, to be careful that he does not, at the expense of his personal and more real necessities, spend too large a portion of this income in the adornment of his mind and on other objects of the like nature less essential to his well being. This subject has, however, been so ably treated by my friend Dr. Keenan, in some papers under the

title of "The Truths and Fallacies of Liebig," in the *Medical Times* of 1844, that, with his permission, I shall conclude this article with the following lengthened quotation, as it is replete with interest and instruction of the most valuable kind, with reference not only to health, but to education also.

110. *The Brain's Power, and the Influence of Education on the Bodily Organs.*—"Now, this fact in the human body" (the centralization of the electro-nervous power) "is generalised; for, when we will to look intensely, we find the nervous energy is so concentrated on the organs of vision, that we hear less readily, nor would a slight impression of touch be so readily felt. In like manner, we can direct by the will the nervous supply to the organs of taste, to the deprivation of the eyes, ears, &c.; and, in the case of taste, no doubt sapid substances co-operate with volition in concentrating the energy to the organs in question. It is also well known that in digestion, when the meal is too large in quantity, and of an intractable nature, such a supply is required by the stomach that it is withdrawn from other organs of the body, making the head dull and the limbs feeble. A most remarkable instance of the power of one organ of the body to monopolize or centralize the animal forces on itself, is exhibited by the uterus, in cases of parturition. This organ, in order to enable itself to overcome the opposing resistance, actually deprives, when it is in perfect and efficient action, every other part of the body of power; the stomach being often, in consequence, unable to retain food; the eye dull, and lazily opened; the motion of the limbs slow and laboured; the voice guttural, from want of energy in the muscles of the glottis to produce a sufficient degree of tension in the vocal chords, so as to articulate a sharp note. All these phenomena indicate a loss of energy consistent with its centralization on the

uterus, and are facts which indicate the existence of a fundamental law, namely—that the human organism has a fixed amount of energy, generated in breathing;—that this amount is the common stock, from which must be drawn supplies to all the organs;—and that, while it may be through the agency of the will, and objects acting on those organs solicited dominantly to one in preference to another, yet it cannot be supplied dominantly to all, nor even to many, at the same time. Thus, by immoderate eating, the animal forces are expended in the digestion of food, in its conveyance to the blood, and its expulsion thence by the appropriate emunctories; while it is withdrawn from the brain, where it was necessary in the sustentation of feeling and of thought. Again, if habit and volition centralize the nervous energy upon the forehead, where it is necessary to sustain the cerebration implied in thought, it is then drawn from the stomach, from the limbs, and from the emotional organs, so that the person becomes at once sedentary, subdued, and cooler in his affections, and clear and effectual in his philosophy. The same is the reason why persons, with a small head, sustaining fewer faculties, are frequently energetic and successful in the exertion of these faculties, when compared to those with a greater multiplicity of brain, and a more complete range of mental and moral faculties. And again, we may often notice the sides of the head and forehead well developed, and the corresponding functions of construction, taste, rationality, &c. well performed, where there is very little development of the moral sentiments. There is one fact that falls under this law, which is too important to be omitted; namely, that the strength or energy employed in the growth or nutrition of the animal machine, is the remainder which is left after all the various functions have been sustained. Thus, if there be too much expended in thought, or even in the sustenta-

tion of some of the affections, or too much in the digestion of crude and unsuitable food, or too much in muscular action, as in hard labour; there is then such a draft made upon the stock generated in breathing, that there is too little left for the organizing formative function; the body is badly built up, and the textures are weakly held together. To make this more intelligible, it must be remarked, that the molecules or globules of fibrine, which form the muscular fibre, are held together by the same chemical or electrical force as that which sustains the animal machine in motion. When the organizing force is feeble, which must always be the case when too much is otherwise expended, the fibrinous globules are both badly formed and loosely held together, and consequently there is produced a defective muscular fibre. Now, without expatiating on this topic, it is easy to understand how expenditure of energy, in various functions, leaves a residue too small for perfect organisation. Hence, we often find scrofulous constitutions connected with, if not produced by, excessive cerebral activity. We often find the most promising intellectual youths overtaken in their studies by consumption; and not unfrequently does white swelling of the knee mark the diminished vitality of the limb, resulting from too much action in the head. Similar causes, operating on the parent, produce in the offspring scrofulous constitutions. Hence it happens that distinguished and overwrought parents seldom transmit, with their fame, a healthy constitution to their offspring. Indeed, the pallid cheek, the leaden eye, and softened muscle, in the severe student, clearly indicate the failure of the organic functions to be contingent on the exaltation of the cerebral. Indeed, if we note, minutely and accurately, changes that take place during progress in education, and so called improvement, we shall far more frequently find that one power has been changed into another,

rather than that new powers have been created. Thus, the son of a farmer goes as a student to one of our universities: he is strong, vigorous, and active; his colour is ruddy, and his eyes sparkling. The action of his senses is not so quick: he more slowly receives impressions from without, and less rapidly acts upon these impressions. Still more is his ratiocination slow. His power of combining and disuniting facts, for the purposes of mental analysis, is almost nothing. You see him again at the expiration of three years: the well-formed muscle is shrunk; the calf of the leg has lost much of its healthy plump contour: the skin, from being fresh and animated, is pale, if not shrivelled; the step is less elastic than before; and the once hardy and robust youth moves forward with a slouching gait, implying in his very motion that all the interest which was once felt in the external world or surrounding objects has ceased, and that he no longer exists or takes delight in what he previously did; but in its stead revels in a world of his mind's formation. Well, he has gained the power of mental analysis, but he has lost much of his capabilities in regard to the objective world. We shall not here enter on the question, has the ardour of the moral sentiments abated? as the mind revolts even from the conjecture that the perfection of its psychological nature implies a defect in the subliming heat of the emotional. Accurate observations of this kind, carefully noting that every gain is at the expense of a corresponding loss of power, will convince every one that the human body, under the same conditions of food, and air, and moral appropriation, is provided with a certain amount of available strength and spirits, which in the language of science may be called a constant quantity; and that when much is expended for one purpose, there remains proportionately less to be expended on others. The application of this doctrine to practical life is very important, as tending

to impose checks upon parents, teachers, and also on young men, ambitious of universal excellence. Such persons are far from knowing that, in the fact of perfecting one faculty they are deteriorating another; when they are rendering the head more clear, they are at the same time making the heart more cold, the power of muscular motion less, and vitiating the process of growth and nutrition. Hence they are often surprised, after all their labours, to find that he on whose every faculty and power the utmost care and attention had been bestowed, is after all no better than his less cultivated neighbour; and that in the real business of life, because the latter is a more natural man, and therefore allied to other men by a greater number of affinities, the latter will often advance before him. This principle is not only true of different individuals in the same country, but is also true of different countries—each having an ascendant over the other in some particular point, for the very reason that it is below that other in some other point. Thus, the high sentimental character of the Irish people arises in a great measure from their less mechanical power and taste. . . . . With regard to the Scotch, on the other hand, the rational or logical faculty is very highly developed; and accordingly we find the emotional (the propulsive faculties) so little developed, that they get time to exercise slow, steady caution. So that, 'if reason be the card, and passion be the gale,' we shall say that the human bark, in the sea of life, has to pay for the perfection of the one, by adopting an imperfection of the other; on the principle, that defect implies perfection, and perfection defect. The reader may receive this with some repugnance, as not being very gracious in the constitution of our nature; yet it is the result of the most wise and beneficent arrangement, and is also most beneficial in its operation. The constitutional arrangement out of which it springs, is this:—to have maintained every

organ or function of the human body in dominant activity, would have required a greater amount of respiration and digestion, and of the resulting galvanoid or electrical force, than man, as at present modelled, could afford: and for that reason, instead of all his organs being kept in dominant activity at once, they can only be plentifully supplied in turns, so that the activity of the one implies the repose of another; and, also, the human subject can exhibit in succession a greater range of mental and bodily activity, than could have appertained to man, if all his powers had been acting coetaneously. This is one of the reasons why man is supplied with a nervous system, in contradistinction to vegetables; the will being thus enabled, by the nerves as conveyancers, to transmit rapidly, to one particular organ, much of the aggregate strength or spirits of the whole body; and thus every organ has the advantage of being able in an exigency to draw upon the power of the whole. In the female constitution, where in parturition the strength of the whole body has to be centralised in the uterus, this is finely exemplified; and the same constitutional provision, which secures this, also entails the power of easy and facile localization on other organs, e. g. the brain; and hence the quickness and shrewdness of the female mind on questions within its natural sphere. Hence, also, the liability, in females, to a greater interruption of nervous equilibrium, as exhibited in their tendency to hysteria, &c. But this difficulty of maintaining many faculties in action, at once, is highly beneficial in the constitution of our nature, in other points of view. It is the principle by which Nature dispenses her gifts, by a determinate limit, more favourably to one person than to another; for, by exalting the first above the second in one particular, she secretly sinks the first below the second in another, and thus brings the two more nearly on an equality than either party may suppose; and, by way

of comfort to each, she makes him take cognizance only of the faculty in which he excels, and thus renders him insensible to that in which he does not excel; so that each is left in the cheering, hopeful and healthful conceit, that he is more excellent than his neighbour."

112. *Excess of Mental Excitement.*—In conclusion of these subjects, I may add, that the action of the brain is, like every other function of the system, increased by moderate excitement, but paralysed by excess. Thus, in anger we speak and act with energy, but in rage can say and do nothing: and thus is it that extreme fright prevents a man from running away or assisting himself. And again, when the mind is over-excited by the force of its conceptions, or by too active engagement, language in one case, and ideas in the other, will not flow;—a state which I have often found remedied by the diversion of the actuating power from the brain, by the exercise of the muscles in a walk; which fact readily explains how some persons can best study and compose, as the peripatetic philosophers did of old, whilst walking composedly.

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113. Having at length completed my explanation of the nature and cause of life, and of the structure and functions of the several organs concerned in the formation, renovation, vitalization, and circulation of the blood; and of the influence of the latter on the maintenance of health; and having explained also the operation and influence of the air, food, external temperature, exercise, sleep, mental action, and moral emotion, upon the system, both for good and for evil; I shall now, after making a few prefatory observations on the nature of disease, proceed to explain what constitutes the fundamental type, the essence or primordial condition, of every disease; and having so done, I shall

next offer an explanation of the operation and influence of the principal remedies in the treatment of disease; and, finally, explain the nature of the various disorders of function and disease of structure of the several organs of the body, and the means to be pursued in their treatment.

CHAPTER IV.

PREFATORY OBSERVATIONS ON DISEASE.—CONGESTION, IRRITATION, OR INFLAMMATION, THE PRIMORDIAL CONDITION OR ESSENCE OF ALL DISEASE: WITH AN EXPLANATION OF THEIR NATURE, CAUSES, AND CONNEXION

114. *Disease; its Character.*—I MUST first observe, that disorder necessarily implies derangement of function, and must therefore bear reference to the duty each organ respectively has to fulfil. Disease, in like manner, bears reference to the derangement of the structural endowments of the organ affected; although, in common parlance, it is not usually so confined in its meaning, nor shall I so limit its signification in these pages. Thus, indigestion implies functional disturbance or disorder of the stomach; whereas inflammation of the stomach, ulceration, or the like, means structural derangement or disease of the organ; but as this must necessarily occasion disorder of the function as well, it cannot, therefore, like the former word, be so limited in its signification. And again, disorder in like manner often occasions disease: thus fever, a disorder of the functions,

frequently, during its progress, develops inflammation of some organ; and this, therefore, is usually denominated disease.

I shall now proceed to explain the condition of the parts concerned, and the character of those all-prevailing affections, *congestion, irritation, and inflammation;* which, I trust I shall soon make apparent, constitute the very essence and parent of every disease.

115. *Congestion; its Nature and Causes.*—This, I must first observe, is a condition of passive plethora, or preternatural distension of the veins of the part affected; and must ensue, as a general condition of the veins, to a greater or less degree, upon every cause of debility or depreciation of the heart's function; and must exist also as a local affection upon the operation of any cause of local debility, influencing the circulation of the part. The amount of the heart's force or power in health, we may presume to be limited to the fulfilment of its functions; its contraction propelling the blood through the arteries to all and every part of the system, and its dilatation (enlarging its cavity as a sucking-pump) drawing the blood back again into it on its return by the veins, into which it is conveyed by the action of the capillaries. The blood is thus kept in constant circulation. But should the heart's power be reduced, or the quantity of blood generated be in excess of its power freely to circulate it, it necessarily follows that, as its impulse is less at the extreme points of the circulation than elsewhere, here will remora or congestive accumulation ensue, and that the veins will be the seat of it, as the arteries have a contractile and vital power extending to and augmenting in their terminal and capillary extremities, which power the veins do not possess. The congestion which results may be slight, temporary, and unimportant; or it may be of marked effect, and productive of effusion of the aqueous portion of the blood, transuding through the coats of the congested

vessels; or the blood itself may be extravasated, or the vessels become ruptured, as in apoplexy: or, otherwise, the distension may give rise, in certain conditions of the blood, to inflammation or fever. The congestion attendant on local debility may ensue upon the exhaustion which succeeds to excess of excitement, or to mechanical obstruction of the veins of the organ or part affected; or it may be developed by cold, or other debilitating local agency.—Enough has now been said to give a pretty clear conception of what is meant by congestion, and how it may be induced; as well as to render it apparent how, as a determining cause of local congestion, debility, natural or acquired, in an organ or part, predisposes to its attack; and thus some persons are said to be subject to determinations of blood to the head, and others again to inflammation of the bowels, chest, or other part.

116. *Inflammation; its Nature and Cause.*—Such being congestion, what is inflammation? This, in opposition to the passive affection of the veins, is one of active excitement of the arteries, and is thus brought about. Congestion in the veins is here also the primary link in the chain of effects. This, then, taking place in certain conditions of the blood as to quality or character, favouring the development of excitement or inflammation, (there being in this case no effusion or insufficiency of it for the relief of these vessels, being perhaps a condition, though this may probably be dependent on the state of the blood,) the free ingress of blood into the veins from the capillary or terminal arteries is prevented; in consequence of which, the arteries become distended, and from this cause, and in consequence of certain chemical changes taking place in the blood, unduly retained in them, which should take place at a more advanced stage of its circulation, are excited into exalted action, or inflammation, as it is called; and hence the augmented sensibility, the heat, throbbing, and swelling, of a part inflamed, what-

ever that part may be, and which every person who has suffered by whitlow, or an inflamed finger, knows full well by experience. The greatest amount of exalted action compatible with the vitality of the part, we assume to be inflammation; beyond this, mortification follows, or, in other words, a series of processes take place destructive to the organization of the part—as softening of the structure, if it be in the substance of the brain, or the formation of pus or matter and ulceration in other parts, the deposition of interstitial matter or hardening in some cases, or, finally, the effusion of serum or transudation from the vessels which result in exhausted power.

117. *Irritation; its Nature and Cause.*—But there may, and I believe does exist a condition intermediate between that of the active condition of the arteries in inflammation, and the passive one of congestion of the veins, which may be well termed *irritation* and which, when general, constitutes the condition of fever. This is dependent upon the same causes and pathological condition of the vessels, namely, the retardation of the blood in the capillaries, and the excitement of the arteries, but not in an equal or so intense a degree as in inflammation; partial effusion from the veins in some cases, increased secretion from the part in others, or the condition of the blood being less favourable to its development, and a less amount of cause, being perhaps the determining causes. And thus it is, for instance, that secretion is increased by a certain amount of the organ's stimulation, but is arrested by the more active condition of its excitement, as in inflammation. Hence also it is that cold in moderation stimulates and excites the system, but in excess paralyses the functions, and induces deprivation of power. Thus also it is that the employment of an organ within due bounds augments its vital condition, and develops its nutrition and power,—and thus the exer-

cise of a man's faculties within certain limits strengthens his mind, and augments his capacity: exceed this limit, and irritation of the brain ensues, and excited intellect, or insanity, follows; and eventually inflammation of the brain, or effusion and palsy, take place.

118. Enough, I am of opinion, has now been said to render the subject fully understood, and make good my assumption that *irritation* consists in a peculiar condition of the blood-vessels of the part affected, and not as an affection of the nervous system. That this peculiar condition of the capillary blood-vessels consists in a state intermediate between that of congestion and inflammation; and that one or other of these affections, or conditions of the blood-vessels locally situated, or existing generally, constitutes the primordial condition or essence of every disease, I shall eventually make apparent. I shall now, with this explanation, proceed to explain the operation, and influence on the system, of calomel and blood-letting, the two most powerful agents we possess in the cure of disease, and also the most valuable, if judiciously employed: and as it is indispensable to understand the nature of a disease in order to determine the principles for its treatment, so is it necessary fully and perfectly to comprehend the mode of operation and the power of our remedies, in order to apply them successfully to practice; which will, I trust, be accepted in apology for my saying so much as I intend to do upon these subjects.

CHAPTER V.

ON THE OPERATION AND INFLUENCE OF BLOODLETTING AND MERCURIALS IN THE TREATMENT OF DISEASE.

119. *Of Bloodletting; its Operation and Influence in the Treatment of Disease.*—This must bear reference not only to the quantity of blood withdrawn from the system at one operation, but to the condition of the patient and the circumstances or stage of the disease at the time it is practised, and the causes, predisposing and exciting, which gave rise to it. In congestive disease the balance of the circulation is disturbed—the force, or resistance to be overcome by the heart's power, exceeds its momentum. This may arise from one of two causes,—either the quantity of blood generated and contained in the system being in excess of the natural force of the heart, as in the case of simple plethora; or the heart's power by some debilitating cause being reduced below the healthy condition and force adequate to keep the blood in free circulation, as in the case of congestion—giving rise to fever in general. Or the debilitating cause may be limited in its operation—and thus produce local congestion; or it may be a general one, but from peculiarities of the part, connected with its especial function and the distribution of its blood-vessels, as in in the case of the liver, or from predisposition or acquired debility in a part, may local or partial congestion more particularly take place.

120. In thus viewing congestion, it is clear that the indications for bloodletting must bear reference to the cause and circumstances of the case, the essential object in all

eases being to adjust the balance between power and resistance. In the case of simple plethora, to withdraw blood, in full and ample quantity, is decidedly to give vigour to the heart, as it reduces the resistance, or quantity of blood to be circulated, to the power of the organ to accomplish it; and under these circumstances what before was an oppressed pulse becomes a full and energetic one.

121. But under other circumstances of congestion taking place, the cause being in general a debilitating one, we must ever bear in view when bloodletting is had recourse to—which it often may be with great advantage—that this remedy bears directly upon the heart's functions, which, be it remembered, is in itself dependent in no inconsiderable degree upon a certain amount of distension. Thus we must be guarded in the quantity we take at one operation, which should be done slowly and in small quantity, so that the heart and vessels of circulation may have time to accommodate themselves to the loss sustained, and be not thus immediately weakened by the operation. With these precautions it may in many cases be repeated at short intervals, several times, with great benefit, both in this affection, and the numerous inflammatory affections of the organs which it so constantly develops, and in the prevention of which this remedy is accordingly so frequently indicated.

122. The importance of the heart's power and offices in relation to the treatment of congestion and inflammation requires my bringing again distinctly under review its function—which consists not only in propelling the blood to the extreme points of the circulation, but in aiding its return also, upon the principle of a sucking-pump; and as this latter of its offices is, I believe, the only really efficient absorbing power in the system, it is obvious that the enfeebling the heart's power will be productive of, or conducive to, not only congestion but effusion also

from the terminal veins or points of the circulation the most remote from the heart's influence and absorbing power, as the primary influence of this power must be on the summit of the column of the blood in the veins. And moreover, as the heart's power is dependent upon not only a certain amount of distension, as before mentioned, but also upon the quantity and condition of the blood in relation to its own organic or structural endowments, it is very apparent that if its quality be much weakened by depletion, and its quantity at the same time reduced in amount, the heart's power will be enfeebled, and the congestion which the bleeding is intended to reduce, will, on the contrary, be augmented in degree: whereas the same quantity or double the amount of blood might have been withdrawn, and the congestion thereby removed, had the precaution been adopted of taking it in small quantities and at suitable intervals. And when I mention, in addition to what has already been said, another not inconsiderable item in the account, this will become still more apparent;—and that is, the immediate effect of bloodletting on the circulation in the brain. The blood propelled from the heart through the aorta by its contraction, has to ascend the carotid arteries in opposition to its gravity, when the individual is in man's distinguishing attitude, the erect position: full distension of the aorta under these circumstances appears indispensable to the blood's ascent to the brain, inasmuch as it would otherwise assuredly take the course of least resistance—the descending vessel. Hence the fainting or deprivation of the senses which ensues upon a copious bleeding—the brain's substance as well as the heart's being in consequence defectively excited. Hence, too, another necessity for caution in the use of the lancet in congestive disease, and a reason why local bleeding, by leeching or cupping, is in general to be preferred in these cases.

123. *Inflammation.*—The connexion between inflammation and congestion is, as I have explained, most intimate: they stand in relation to each other of cause and effect, congestion of the veins giving occasion to excitement in the arteries. Excitement is therefore, in inflammation, its distinctive characteristic, and for which there must be some sufficient reason. The quality of the blood, and the amount of the distension of vessels, will, I am of opinion, fully explain this. The congestion with respect to quantity in one case being overwhelming in amount; or the distension extending to the arteries, in another, being prevented by effusion; and in a third case existing in a degree, to the production alone of the excitement of irritation—are all instances various in kind, but short of the required degree; but on this occurring, inflammation is developed; and more especially so in certain conditions of the blood—in relation to its chemical qualities favouring the development of calorie and electricity, and its consequence, excitement,—which is, accordingly, inflammation. Bleeding in this case, it is obvious, fulfils a twofold purpose: it relieves the amount of congestion, which in general is considerable, at the same time that it reduces the combustible qualities of the blood's constituents; and as these may be supposed to exist in a ratio with the more or less exalted state of the inflammation, we have in this a finger-post to direct us (a thermometer with this view might prove a very useful indicator,) for its employment, which may be local or general, dependent on its seat, and to a greater extent, generally speaking, than in simple congestion, for the reasons assigned. And, moreover, when general bleeding is required, as in high synochal or inflammatory fever, or in inflammation of the more important organs of life, which can only be affected through the general circulation, it may be often very advantageously carried to the extent of in-

dueing fainting, or abeyanee of the brain's funetion, and the perspiration of relaxation whieh aeeompanies that eondition —taking it in this ease suddenly, from a large orifiee, the patient being in the ereet position, and repeating the operation a few hours afterwards, and as often as may be required; remembering, in these eases, if inflammation be not speedily relieved, it will often prove destruetive to the organization of the part affeeted.

124. *Stimulants.*—Upon the same prineiple that we withdraw blood from the general system to reduee the amount eireulating in a part thereof, may we with equal propriety, in some eases, exalt the aetion of the general system, in relief or reduetion of exeitement of a part locally affeeted. And these are the means by whieh, I believe, mereurials operate in many cases, and are so generally useful in the treatment of inflammatory affeetions, independently of their operation on the seeretive organs; and the means also by whieh bark and port wine, or stimulants in general, are, in some deseriptions of fever, found so beneficial: but of this hereafter.

125. *Of Mercurials in the Cure of Disease, and of Calomel in particular.*—Whatever be the preparation of mereury administered, the eondition in whieh it is reeeived into the system from the stomaeh, I believe to be that of a chloride, seeing that it must be first subjeeted to the influenee of the hydroehlorie aeid of the stomaeh's seeretion, and dissolved, before it ean be reeeived into the eireulation. Henee it is, in my opinion, that ealomel (the ehloride of mereury) is so mueh more eertain and determinate in its effeets, and therefore so superior as a remedy, to all and every other preparation of mereury we possess.

126. The operation of all remedies reeeived into the stomaeh, I believe to be in admixture with the blood, after their absorption from the stomaeh; experiments reeently

made having established this in my mind beyond question. The stomach, nevertheless, is subject, doubtless, as much so as the skin, to irritation and other local agencies operating upon its surface; and thus through its nervous sensibilities also may it be affected, as well as other organs connected with it: but neither calomel, jalap, rhubarb, wine, nor many of the numerous things administered as remedies, do so specifically affect it—not even ipecacuanha! An infusion of this substance, injected into a vein of the leg, operates as an emetic in a quarter of the time required by any quantity administered by the stomach. These, when taken, are accordingly first absorbed into the blood, and each, during its circulation, severally operates in its own particular way, jalap as a purgative, and ipecacuanha as an emetic, either directly upon the organ influenced, or indirectly so, by first influencing the brain and nervous connexions of the part. In proof of this, the same remedies applied to a blistered surface, from which they become severally absorbed, and in like manner operate as when taken into the stomach.

127. *Mercurials increase Capillary Excitement.*—Calomel, when absorbed by the veins from the stomach and bowels, in its passage with the blood through the liver, to which it is immediately conveyed, excites this organ to increased secretive function: hence the bilious evacuation which so constantly succeeds to the use of a grain or more. Proceeding from the liver, and admitted into the general current of the circulation, its operation I believe to be specific on the capillary system at large, exciting these vessels to increased action. Hence its general influence as a stimulant to the whole system—its renowned deobstruent power, and operation on the glandular system—in increasing all the secretions. Its operation in exciting the capillary arteries, and thereby secretion, necessarily removes obstruction from the exhalent vessels, and congestion from their

venous terminations—the cause of exudation; and thus is exudation prevented, and absorption at the same time increased; and hence the accredited action of mercury upon the absorbents, in removing exudation of whatever kind, and the various dropsical affections. Its operation on the capillary system being general, the action of the heart and that of the brain, through the medium of their organic structure, is excited also; and, in short, all the functions. It thus operates, probably, by imparting qualities to the blood, by which its constituent particles may have a greater affinity for oxygen, the vitalizing principle; and thus may increased chemical action in the bloodand its consequence—excitement—take place throughout the system. But whether this be the mode of its operation, or not, the effect is, as I have described it, excitement to the general system.

128. *Indications which Mercury fulfils.*—The power of mercury in increasing capillary action, is further evinced by the febrile commotion it excites in the system, and the buffed blood of those under its more abundant influence,—effects succeeding to its exhibition, which should be guardedly watched, (generally occurring when it has ceased to operate as an evacuant,) and when they arise its further use should, in a general way, be prohibited; though in some cases it may be employed with great advantage upon the principle (noticed when treating of bloodletting,) of exalting the general excitement of the system, in relief of a local or partial affection; thus showing its use in inflammations of the bowels, and numerous other organic inflammations. But, speaking of its employment in a general way, it may be observed that the indications for its use in inflammatory affections are limited to the atonic stage, and that of oppression. In no case should it be given in the intermediate or more active stage of inflammation, involving the heart's excitement, save in very guarded doses, and in conjunction with other evacuants. But when the

more active condition of inflammation, or of fever, has been moderated by bleeding and other evacuants, or when debility has succeeded to previous excess of excitement—the atonic condition of these affections of the capillary system—its administration supports a due action of the capillaries, excites the secretions, and invigorates the heart's action, in common with the rest of the functions, and accordingly becomes our chief remedy; and carried to the extent of inducing increased salivary secretion—which appears to mark its ultimate effect for good—is of all remedies the most valuable.

129. *Calomel; its Effects with reference to Quantity.*—Upon the subject of quantity, I have a few observations to make of much importance. I have endeavoured to prove, in various parts of this essay, that all agents, in their operation on the system—whatever those agents may be—whether physical or moral, or whether operating upon a part of the system, or upon the whole—have their effects determined, and in all cases bounded, by the quantity of influence imparted. Thus wine, in moderate quantity, produces exhilaration and excitement; excess of it, atony and death. Heat in moderation produces excitement; excess of it, as in a severe burn or scald, mortification and death. The reverse of heat—cold—in like manner, within a certain range, as in the plunge of a cold bath, produces a glow and excitement; extreme cold, on the other hand, palsy and death. Anger in moderation produces vehemence and excitement; extreme anger, or rage, on the contrary, often deprives the person of utterance and propriety. Fear will induce a man to fly; fright, on the contrary, fixes him to the spot. In extreme grief no tears are shed; in moderate grief they flow abundantly. Enough has been said, I think, to establish the fact I have in view, and which, in reference to its application in a variety of ways, has been too much

neglected, and especially so in the administration of mercury. A grain or two of calomel, my experience justifies me in saying, will in all cases, (unless there exists some specific disease obstructing the blood in its passage to or through the liver,) with very few exceptions, produce one or more bilious evacuations: this it does by moderately exciting—that is, increasing—the natural action of the liver, to which it becomes, when absorbed from the stomach, immediately applied. If the object, therefore, contemplated in the administration of this remedy, be the increase of the biliary secretion, it should be given in a quantity limited to from one to three grains; whereas it is an every-day practice to give it in a large dose, to prevent, as practitioners say, its griping the patient. Now, griping, I maintain, is the natural effect of an acrid condition of, or long-retained bile in, the liver or its appendage, the gall-bladder; and if this takes place when I administer a small dose, I hail it as the best evidence that the remedy was required and in the extent of dose in which I have administered it, and I am thus dislodging the enemy—the cause, not unfrequently, of all the patient's ailment; whereas a large dose—what does it do? It so hurries the circulation through the secretive apparatus, that secretion is not effected; the excess of excitement paralyses the natural endowment of the part, and consequently there is either no secretion, or secretion of an altered kind, and perhaps without griping. This, in some cases of disease, may be a very proper measure, and I know it to be so, but not in fulfilment of the purpose mentioned—namely, that of increasing the ordinary biliary secretion.

130. *Calomel; its Value as a Remedy.*—The fruits of my experience justify me in declaring, that if there is any single remedy in the cure of disease, meriting the name of *universal*, that remedy is calomel. The explanation I have given of its operation and the universality of its influence

on the system, in exciting the functions of all the organs, and increasing all the secretions, renders it evident, I conceive, that it fulfils indications of one kind or other in the treatment, with few exceptions, of every disease—which are all, it may be truly said, with very few exceptions indeed, based upon depression of the active energies of life;—health, as I have before said, consisting in the due action and efficient performance of the various functions of the system. Judiciously employed, I can say with confidence, in opposition to much prejudice on the subject, founded on the circumstances which first introduced it into practice in this country, and its too commonly improper mode of administration, (the principles by which its employment should be regulated not being understood,) that calomel is as harmless as iron, or any other of the numerous articles of daily remedial administration. This conviction, be it remembered, is the fruit of thirty years' experience, twenty of which were spent in India, where this is the chief remedy employed in the cure of disease, and one of universal use both by native and European practitioners.

CHAPTER VI.

ON THOSE TWO ALL-PREVAILING FORMS OF ILL HEALTH, DYSPEPSIA AND NERVOUS DERANGEMENT.

131. Having completed my explanation of what constitutes the primordial condition, the initial type or essence, of disease, and explained also the operation and influence of the principal remedies in the treatment thereof, I shall now proceed to trace the operation of the various causes in giving rise to these affections as they become located in the several

organs of the body, and constitute the numerous diseases to which man is subject. But before I enter upon this analysis of the diseases of particular organs, I shall first notice a few of the more frequent causes of derangement of health, and the means to be pursued for their treatment and prevention.

132. *Dyspepsia.*—Of all the forms of derangement of health in social life, indigestion is assuredly the most frequent. All at the present day have become dyspeptics. The cause of this is simply, that (none being able to live without food) man's diet is not of suitable description or proportionate in quantity, it being too commonly in excess of the air and exercise taken or the necessities of the individual. Hence, from the excess of nutriment received into the blood on the one hand, and excess of occupation of the digestive and assimilative organs on the other—engaging too much of the motor or electro-nervous power—arise the smothered combustion in process in the system, and the murky state of feelings so commonly experienced. This state, increased but too frequently by the use of stimulants and provocatives, develops other derangements, the most prominent of which is a disordered state of the stomach; and the symptoms are accordingly—indifferent appetite, torpid bowels, acidity of stomach, flatulence, head-ache, sense of *malaise*, and fulness about the region of the stomach and liver; restless, dreaming, or sleepless nights; a sense of stuffing or oppressed breathing; a languid circulation, with coldness of the extremities, or feverish irritability; languor, and disinclination to mental exertion; a foul tongue, and so forth. These symptoms, wholly or in part modified by the particular circumstances of the individual, are obviously those of that all-prevailing affection, dyspepsia, as it has been called, and which it is not to be wondered at is so seldom cured, seeing that the seat of the disease is not in the stomach, nor to be removed by staying at home and

swallowing physic, as it is so commonly thought to be; nor is it in the nervous system—another direction in which attention is usually pointed,—but in the general system and bad habits of the individual, and is there alone to be effectually combated, although it is true that accessary agents and temporary expedients may very properly at the same time be brought to bear upon its removal; the chief of which are obviously evacuants. But the case rests with the individual alone, in following up these temporary expedients by a more abstinent or suitable diet, and taking an increased amount of air and exercise—the essential remedies, and for which there can be no substitute. The coals in the grate will not burn without a sufficient supply of air; with an insufficiency, there will be little light and heat evolved, but plenty of smoke: the bellows is the remedy in this case, and air and exercise are its representative in the former. Added to which, however, if the cause has been long in operation, the means hereafter to be pointed out in renovation of the system, may also be necessary; and attention is in all cases required to the means of preserving health, which I have also specified.

133. And first we will consider the measures of evacuation. The remedy of most value is calomel, which will not only purge the bowels of their contents, but relieve the system, by the increased secretion by the liver, which it will excite, of a quantity of the hydro-carbonaceous matter (or excess of fuel in the blood), which, as bile, will be poured out into the bowels and excite them to evacuation. It will moreover fulfil other most useful purposes, by increasing the circulation in general, and the secretions in common—the urinary and perspiratory likewise. A single grain of calomel—(a grain and a half or two grains at most, according to the age and constitution of the individual)—in combination with the same quantity of soccotrine aloes, and sufficient Castile soap

to make the whole into a pill, one being taken every night for a week or longer, or every second night if it be found too active, will in general fulfil the purpose very effectually. The intention of the aloes is, as a purgative, to accelerate the expulsion from the bowels of the bilious secretion poured into them by the agency of the calomel, and thereby prevent irritation and the re-absorption of bile.

134. No stimulants are in this case required, but the one named, and stimulant it is of the most general kind, seeing that it excites the circulating powers and all the secretions. The importance and utility of calomel as a remedy in this and most diseases are, however, so great, that I must entreat the reader to make himself master of the subject by returning to the chapter in which that substance is treated on.

135. More than what I have advised, in the shape of medicine, will seldom be required; but it should be conjoined with a fluid abstinent diet, as broth, beef-tea, well-boiled rice, and the like description of aliment, abstaining also from beer and spirituous beverages; and following up this with air and exercise proportionate to the capabilities of the individual and the necessities of the case. These means alone are the essential and radical remedies to be resorted to. For anything further in the shape of remedy and treatment of this and its attendant ailments (as hypochondriasis, &c.) I refer the reader to the chapter on Disorders of the Liver and Stomach.

136. In conclusion of this subject, I must be permitted to add the following very just observations of Mr. Newnham: "Both cause and effect are generally misunderstood; the patient rests in generalities; he has a weak stomach, or his digestion is not good; or he has eaten something which has disagreed with him; and the inquiry ends here, instead of really ascertaining what is the cause of this commencement of evil; and so the time for remedial agency is suffered

to pass unimproved; nature's apprehension of evil is entirely thrown away, till the stomach's consciousness becomes pain, and a grand centre for the radiation of morbid action; digestion becomes more feeble, the food is not properly assimilated, the body is not adequately nourished; the blood ceases to acquire all the red particles it demands; the cerebral system is supplied by blood which is not endowed with a sufficient amount of vitality; the production of nervous energy is rendered uncertain, irregular, defective or even irritative; every function languishes; every organ is tossed from its equilibrium, and becomes less capable of supporting life; disease advances, and the system is worn out by irritation, *if not previously destroyed by ulceration of the stomach* or other organ."

136[2]. *Nervous Derangement.*—The next great and all-besetting bane of health, at the present day, is *excess of mental employ.* In one class of society, the allurements of the press, in the shape of novels, newspapers, and periodicals of various kinds; in another, ambition, professional pursuits, and the like; and in a third, the cares and disquietudes of competition, and the various heart-burnings of civil life, of love, and of the passions;—these, in their various forms and combinations are working a great amount of wretchedness in the shape of dyspeptic and nervous ailments, diseases of the heart, and a variety of affections, and overspreading our land with lunatic asylums. In the rising generation, too early education, confinement, and close application, are laying the foundation of much after-suffering in developing over-susceptibility of mind and weakly constitutions,—the rudimentary conditions of consumption, scrofulous disease, and mental alienation.

137. The derangements of health, founded upon the above causes, are primarily dyspeptic, and subsequently nervous or complicated. The dyspeptic class of diseases we

have already glanced at; the nervous will be now the object of our consideration; and these are often the most prominent of the two. As the subjects of this class of ailments, instead of taking too much sustenance, are but too often negligent of their meals, and as the stomach is, as I have before said, in antagonism to the brain as far as the mental functions are concerned,—so from this cause (the want of sufficient ballast and stomach-employ) the mental faculties are so much in a state of preponderant excitement, that there is a constant craving for employment, with but little aptitude for the necessary application to successful result. Thus the restlessness of pursuit induces such persons to be regardless of the ordinary enjoyments of life and a comfortable meal; their minds at the same being proportionately susceptible and irritable. From this cause, when the head is laid upon the pillow, but little sleep is to be obtained; the head too is hot, and sometimes painful, and the bowels torpid; such persons also rising in the morning giddy, and but little refreshed. It is unnecessary for me to say more than that the dyspeptic symptoms will be more or less prominent, according to the habits of the individual in relation to the amount and kind of food, beverage, and exercise taken, as well as the purity of the air respired, the temperament and constitution of the individual, and other circumstances of the like nature. The symptoms being thus understood, the treatment is obvious. A devotion to air, exercise, and proper nutriment, is indispensable, in opposition to mental employ (which must be at once thrown aside) or perturbation of any kind. Attention must at the same time be paid to the existing derangements of the digestive organs,—exciting the bowels by purgatives, (as the pills of calomel and aloes,) in antagonism to the head, being however in general all that is necessary in this way.

138. *A Remedy for Mental Anxiety.*—To these observa-

tions I have one other to add, namely, that the restless, sleepless and wretched condition which so often succeeds to anxiety of mind, or perturbation, or too active study, or other cause of the brain's temporary excitement, is best remedied by a large but not immoderate dose of opium. A grain, or a grain and a half, on going to bed, will often act as a charm in these cases, affording immediate and permanent relief; so much so, that if it were more frequently had recourse to, we should hear of few of the melancholy cases of suicide which so frequently occur, or of insanity, which not unfrequently follows such a condition.

139. I shall next, in continuation of this subject, proceed with my analysis of the diseases of the brain.

CHAPTER VII.

ON THE DISEASES OF THE BRAIN AND NERVOUS SYSTEM; AND THEIR CONSEQUENCES,—APOPLEXY, PALSY, INSANITY, DISEASES OF THE HEART, &c.

140. *The Number and Character of Diseases originating in Excess of Mental Excitement.*—The primary and most frequent kind of derangement of health, (based upon excess of mental employ, perturbation, and excitement,) I have already glanced at, as it exists in its most simple form. I shall now trace the further progress of this neglected ailment, in developing a series of disorders of the most formidable description. The income of electro-nervous power, I repeat, is at all times a limited one, fluctuating, though necessarily, with the health. Undue expenditure and appropriation of nervous power by the brain, by preternatural excitement and undue employment, will occasion torpor or defective excitement of the stomach and associated organs—the fund of power for the excitement of all the func-

tions being a conjoint income; and thus may these organs be said to be in antagonism to each other—that is, the brain to the stomach. I mention the stomach in particular, it being the central organ of the body and the representative of the rest. The simple derangement or torpor of the stomach and associated organs is all that I have yet noticed as flowing from this cause; but it must now be observed, that this is but the shadow of the substance of the evils that follow undue excitement of the brain. The excitement of an organ, whatever that organ may be, gives rise to, or is productive of, a determination of blood to, or an exalted state of the circulation in, that part. Hence, if the brain, or any part of it, be kept in a constant state of action or excitement, though but of a passive character, as in continued thought, more particularly if that thought be of an emotional kind, and confined to one subject, (as in the case of grief, anxiety, unrequited love,) as well as by intense application, ambition, or other active mental excitement—congestion of the blood-vessels, or accumulation of blood in the part thus preternaturally exercised, will of necessity ensue. This will impede the circulation through the part, and disorder or weaken its function. And more, if the cause be allowed to continue in operation, and the congestion maintained, exudation will follow; that is, serum, or the aqueous portion of the blood, will be effused, or transude through the coats of the congested vessels, and palsy or apoplexy will consequently follow: or in other cases, where predisposition exists, and effusion does not take place, or in certain conditions of idiosyncrasy, or conditions of the blood, mental delusion, or the excitement of insanity, will be the result. And again, should these evils not occur, others of equal magnitude will follow, flowing out of the same cause; and to these I shall now direct attention. To congestion of the brain, and torpor of the assimilating and

secreting organs, which are coincident in these cases, disorder in the constitution of the blood must of necessity succeed—developing immediately, reflectively, or remotely, a host of complications and ailments, as disease of the heart, lungs, liver, or kidneys, as well as gout and a variety of neuralgic affections—(painful or spasmodic affections of the nerves). The nutritive and structural endowments of the brain will also from this cause (the blood's unhealthy condition) be diseased, perturbating thereby the mind's manifestations: hence, in illustration, it may be mentioned that when the liver is torpid, and does not divest the blood of certain effete or recrementitious particles, (the bile's constituent elements,) irritability of mind and despondency notoriously ensue. Those mentioned are a few of the disorders, which, being more readily traced out of the multitude caused by this simple but most pernicious practice, (immoderate or preternatural mental excitement,) I shall now attempt to explain.

141. *Diseases of the Heart.*—And first, with respect to the heart. All persons must be sensible of the effect of mental excitement upon this organ. The bounding of the heart in the chest, the throbbing of the arteries in the head, which attend anger and some other causes of excitement; and on the contrary, the sense of fainting and withering of the heart, as sometimes expressed, which attend fright and some other causes of mental perturbation, will of themselves occur to every mind as exemplifications of the capability of mental impressions to derange at once and immediately the heart's action, and to an extent even in some instances, as in sudden and extreme joy or fright, of inducing immediate death.*

* The varied examples of the influence of the mind upon the body have been thus prettily detailed by Mr. Newnham in his work on this subject:—"The suffusion of the countenance in blushing, the shrunk features and pale goose-skin produced by alarm, the chattering of the teeth under fear; the

And acknowledging this, they will readily apprehend how a minor degree of the same or other cause of mental disquietude or excitement, operating for a lengthened period, may, as it assuredly will, produce slow but permanent derangement of the heart's function, and eventually structural disease also. The heart, it will be remembered, is a very complex organ, consisting of four distinct parts, each having to contract and dilate in a regular order of succession, not less than five thousand times every hour of our existence; and to this must be added, the duty to be performed by eight valves, in opening and closing the doors against the blood's admission an equal number of times. These facts being considered, no doubt can enter the mind of any man of the consequences being as I have stated;—excluding for the present other causes of the heart's derangement, arising out of the blood's deterioration, from the disorder of the assimilating and purifying organs which is co-incident, and their reflected operation as well, giving rise perhaps to ossification of the valves and angina pectoris. And thus spasm of the heart, sense of oppression, palpitation, an intermittent pulse, and a variety of other derangements of the heart's function, may be readily accounted for; and which, I repeat,

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increase of various secretions from mental emotions — as of the tears in sorrow, or of the bile in anger; the palpitation of the heart under almost every sudden emotion; the short and quickened breathing of expectation; the oppressed and stifled respiration of intense and harrowing emotion; the arrest and almost imperceptible action of breathless anxiety and expectancy; the expression of the muscles of the countenance alternately lighted up with joy, or worn with anxiety and suffering; and the thousand varied emotions they are capable of expressing: the plump portliness of the man at ease, and the extreme thinness of the victim of deep disappointment or of any long continued devouring passion; so that to be dried with grief, to be devoured by remorse, to be consumed by sorrow, are not only common expressions, but literal representations of actual bodily conditions, dependent on mental emotion and moral influences."

if allowed to continue, will assuredly develop structural disorder or disease, either of the valves or the cavities, as a necessary consequence; and not of these only, but will involve the lungs in disease also. The circulation of the blood through these organs, which are immediately connected and associated in function with the heart, being by the affection of the latter more especially impeded—pulmonary apoplexy and chronic inflammation of the air-tubes, or of the membranes enveloping the lungs, are developed; and dropsical effusion into the chest or pericardium (the heart-bag) will take place. Enough has now been said of affections of the heart, arising out of this cause, to render them understood: for what I have further to say on the subject of affections of the lungs, liver, and kidneys, I must refer the reader to the future chapters upon the diseases of these organs respectively, as well as for the subjects of gout and neuralgia.

142. *Apoplexy and Palsy.*—Returning to the affections of the brain, I must now enlarge upon the subject of apoplexy and palsy. I have already explained how congestion or preternatural distension of the veins of the brain, wholly or in part, may ensue upon disquietude or excess of mental employ, and terminate either in sudden deprivation of the senses, (the function of the brain by oppression ceasing, as in apoplexy, the blood-vessels being moreover ruptured from excess of distension in some cases; and in severe cases the bleeding being considerable, and the pressure on the brain great, implicating the action of the heart and respiratory function also, and causing immediate death,)—or in a more gradual manner may effusion of the more fluid part of the blood take place from the congested vessels, and develop the same affection, or the minor one of palsy, characterized by privation of the power of volition, or of sensation, or of one or more of the especial organs of sense, (without implicating the whole

as in apoplexy,) affecting the integuments or muscles of the face only, or one or more of the limbs of the body, though in general two, the arm and leg of the same side. These effects are determined by and dependent upon the situation of the pressure of the effused fluid and the portion of brain affected and more immediately connected with the nerves of the parts paralyzed. The same paralytic affection, moreover, in general succeeds to or accompanies the attack of apoplexy—which is indeed palsy of a more general description.

143. *The Apoplexy of the Fat and Plethoric.*—Another cause of these affections is one of a totally opposite character to that previously assigned; the want of mental excitement in the majority of these cases being the primary cause of the disease, which in this case occurs in persons whose time, or rather the functions of whose system, are almost exclusively and totally engaged in the digestion and assimilation of food; and who accordingly generate more blood than is compatible with the necessities of the system and its free circulation; and whose muscular power and fibre being weakened withal by the want of sufficient exercise, the vessels of the brain, thus weak and engorged, give way, and apoplexy ensues. Nature, in the majority of these cases, attempts for a while her own relief, or the prevention of mischief from these causes of super-nutrition, by the development of fat; this, however, has its limits for good, its excess becoming a source of further weakness and derangement, inasmuch as its accumulation taking place about the heart, kidneys, and other organs occupying the cavities of the chest and abdomen, prevents the descent of the diaphragm and the full expansion of the lungs, and consequently the aeration of the blood. From this cause, and the fulness of the blood-vessels diminishing the amount of their absorbing power, (which Majendie proved was in the inverse ratio

of their distension,) less oxygen will be absorbed into the system, and in consequence less combustion of the constituents of fat will take place, and less motive power will be generated. And hence, from this cause and the distension of the blood-vessels of the brain, the constant tendency to sleep by which such persons are all day long possessed ; and more particularly so after a meal, the distension of the stomach still further diminishing the descent of the midrif and the expansion of the chest.

144. "Laugh and grow fat" is a common expression. Great laughers in most cases having nothing much better to do ; but the penalty of a man's indolence and waste of his talents but too frequently awaits him in an attack of apoplexy ; so that great laughers have not much to boast of after all.

145. *The Attack of Palsy.*—Palsy, as I before observed, often attends, or becomes the sequel of, apoplectic seizure ; both being the same in kind, but varied in extent of operation. Thus palsy (the minor affection) succeeds the apoplectic seizure from the absorption, consequent on the treatment pursued, of a portion of the blood or fluid effused, which had overwhelmed the senses also in the first instance ; or the primary mischief may be of a more limited kind, and palsy, or privation of muscular power, without apoplectic seizure or deprivation of the entire senses, may take place, of which the subjoined case (the last I have seen) offers a common example. A lady, residing at Chelsea, who had suffered for some time by a sense of general weakness and oppression, sleepiness by day, and torpid bowels, whose menstrual periods had terminated, and who had been for some time the subject of anxiety, accompanied her daughter to the Great Western terminus at Paddington, on the return of the latter into the country. Soon after her arrival there, she was suddenly seized with an indescribable feeling

of general weakness, requiring her to be immediately put into a fly and sent home, where on arrival, and on being taken out of the coach, it was found that her right arm and leg were completely palsied; she was perfectly conscious during the whole of the time, and her senses were entire. The attack in this case was developed by the excitement connected with hurrying to the station in time, and the emotions of parting with her daughter, operating upon a system predisposed to the attack by plethora and anxiety.

146. *Symptoms of approaching Apoplexy.*—Apoplectic seizure seldom occurs, I believe, without some premonitory indication: but I fear the symptoms of premonition are frequently not rightly understood, and the warning voice of nature is accordingly too often neglected. Two cases, preceded by cataract, have lately come under my notice. In these cases of obscurity and thickening in the coat of the lens of the eye, did not the cause consist in the congestive condition of the blood-vessels of the brain? In one case it was obviously so, the outer coat of the eye being also bloodshot. In another case, obscurity and weakness of sight and deafness had for some months preceded the attack, and were doubtless dependent upon the same cause—congestion of the blood-vessels of the brain about the roots and origin of the nerves of those organs of sense. I was myself for a long time extremely deaf. An attack of fever, which supervened upon exposure to the sun, and general derangement of the system, induced me to be bled, and apply twenty leeches also to the back of my head. On recovering from fever, my hearing was restored. Numbness and loss of feeling in the extremity of the fingers, is another acknowledged indication. Loss of the sense of taste and smelling, or of the memory, stammering and difficulty of articulation, as well as sleepiness by day, and sense of weight and fulness of the head, vertigo or giddiness, and in some cases oppression of breathing,

paucity of urine, and torpid bowels, (the latter, too, being but little amenable to purgative medicines,) are all symptoms of congestion of the brain and premonitory of apoplexy, which should in no case be neglected, and especially by the female at that period when it ceases to be with her after the manner of her sex, and by others of sedentary occupation.

147. *Treatment of Apoplexy and Palsy.*—The symptoms enumerated all clearly manifest oppression of the brain and depreciation of the function of that portion of it more especially affected. I shall now enter upon the treatment of apoplexy and palsy. The cause of these affections—namely, congestion of the brain—I have pointed out to be of a twofold kind, either as a consequence of super-nutrition of the system, or of a preternatural determination of blood to the brain by undue excitement—mental in most cases. Mechanical causes of cerebral excitement, as spiculæ of bone, or preternatural growth of any kind, rather develop epilepsy or convulsions; though the latter affections are doubtless more frequently occasioned by the reflex operation of visceral irritation, as we see exemplified by worms in the intestines and in dentition. I do not here take into account the apoplectic condition which attends morbid conditions of the blood, as in cholera and congestive fever—producing oppression of the brain, coma, and convulsions, which will be more properly noticed when treating upon these subjects. Referring to the causes of apoplexy previously assigned, the treatment necessarily bears reference to the particular cause which has provoked the attack. The first (super-nutrition) obviously calls for copious bleeding, for the removal of both cause and effect,—the quantity of blood, on the one hand, which has occasioned the rupture of the blood-vessel, or of the effusion from distension of their coats, and, on the other hand, in aid of the absorption of either. Majendie's experiments, I here repeat, having proved that absorption, whether

effected by the imbibition of the veins, or of the absorbent vessels—the drains, as I have elsewhere exhibited them—is carried on in all cases in the inverse ratio to the distension of the blood-vessels. Bleeding in such cases, with abstinence from fluids to as great an extent as possible, and warm fluids in particular, and a less nourishing diet, are assuredly the chief remedies; and if the general health has been pretty good up to the time of attack, this, as it appears to me, is all that is essentially necessary; though an active purge (as a good dose of calomel and jalap) at the time may be a very proper adjunctive measure to secure the system from any irritation which might be in operation from this quarter, and produce determination of blood and excitement to the bowels, in relief of the brain. The bleeding, however, to be successful after the first operation, must be in moderate quantities at each time, and at short intervals, so as to produce no shock upon the restorative powers of the system; that is, depression of the heart's function, which, be it remembered, is not only that of a forcing-pump, but of a sucking-pump also—propelling the blood from one of its cavities by its contraction, and drawing it back again from the veins into another by its dilatation, which is as much an active effort of the heart as its contraction: and as this is the really efficient and, I believe, only absorbent power of the system, it is obvious that enfeebling this will, instead of its removal, be productive of, or conducive to, congestion taking place in the terminal veins; but upon this important subject I must refer the reader to the previous chapter on bloodletting. In this particular instance of overwhelming distension, in the primary condition of attack, a large bleeding may be advised, which at a later period would be very improper; and for reasons which will be obvious, the head and shoulders of the patient should be supported high above the rest of the body in bed, both to favour the blood's re-

turn from the brain, and to diminish its ascent thereto; the head should be kept cool also by enveloping it in a wet towel. In addition to these means, abstinence from all stimuli, physical and mental, should be adopted, till the patient can get about again; though, in some few cases, the immediate shock upon the system may occasion the necessity of some restorative or moderate stimuli being had recourse to; this, however, can be but for a temporary purpose, namely, that of re-animating the heart when it is much depressed, and when adopted should be used conjointly with the depletive and more permanently beneficial remedies. With this intention, hot flannels may be applied to the chest, and the feet and legs enveloped in hot mustard poultices; at the same time a few spoonfuls of hot brandy-and-water, or thirty or forty drops of hartshorn spirit, or sal volatile, may be administered; or if this is not practicable, a large clyster of hot water, with three table spoonfuls of spirit of turpentine, and one of common salt, may be thrown up the bowels. These are remedies applicable only to the period of invasion; but in cases in which the individual has been habituated to drink freely of wine or other stimulating beverage, a continuance of the same to a moderate extent may be required throughout the treatment, as, from what I have before said, it must be obvious that the heart's power must be maintained. Should the evacuations produced by the purgative be dark and unhealthy, a pill of calomel and aloes (a grain and a half of each) may be continued night and morning; or if the bowels are very torpid, which they frequently are in these cases, a draught, consisting of two ounces of senna tea, with a tea-spoonful of Epsom salts, may be conjoined, till the evacuations have a more healthy appearance; and the bowels may be subsequently kept open with advantage by continuing one of the pills every night, which may supersede the necessity of

further bleeding, when a certain amount of amendment has taken place; but the bleeding nevertheless is not to be too hastily omitted, for reasons hereafter to be explained.

148. *The Treatment modified by the Cause of Attack.*—Should, on the other hand, undue mental excitement, developing congestion or exudation, have been the cause of attack, a treatment modified by the different circumstances of the case should be adopted; the congestion being of a more local character, or operating upon a system otherwise than full, bleeding in smaller quantity, at longer intervals, should be practised, or cupping or leeches be preferred. And in substitute for bleeding, more should be done upon the principle of derivation in these cases—which being developed by excitement, excitement it should be our object to transfer. This may be done by the irritation of a blister applied to the nape of the neck, and between the shoulders; and by exciting the secretions of the liver and bowels in a more eminent degree by the pills of calomel and aloes, which are moreover often especially indicated by the state of torpor and derangement of these organs, which is so frequently concomitant, and in some respects a cause of the disease itself.

149. *Further General Treatment.*—If the paralytic affection which so generally succeeds the apoplectic seizure is not removed by the means already advised and steadily carried out, it will be proper to try the effect of gentle salivation; for which purpose a grain of calomel may be taken night and morning till a free but moderate flow of saliva is induced. If this does not fulfil the purpose, a succession of blisters should be applied to the spine, alternately to the sacrum, (or bottom of the backbone,) and the nape of the neck, if the lower extremity is palsied, or to the nape and back of the head if the upper extremities are effected; the limbs affected in all cases being well rubbed, champooed and exercised, twice or more frequently in the day. Should

these means prove unavailing, they may be followed up by a trial of the strychnine, which experience proves to be a useful remedy, in doses of a twentieth part of a grain two or three times a day, gradually increasing the dose till a grain is taken daily; and with this may be conjoined the douche bath, or stream of cold water, for a few minutes daily upon the head and along the course of the spine; or electricity, in gentle shocks along the course of the nerves of the limbs affected, and sparks may be applied also to the muscles, as I have in several cases seen successfully practised. Another expedient I once had recourse to in a case of the kind, with some apparent benefit, may be also tried—that is, laying a train of gunpowder along the whole length of the spine from the head to the sacrum, and then firing it from the centre; it scorches the skin without blistering it, and is but little painful. In addition, however, to all these means, I must again mention an occasional moderato bleeding—not to reduce the powers of the system in any way, but to aid in that of absorption—a clot or the pressure of fluid still being the cause of the symptoms, unless they be occasioned by some positive structural alteration—in which no harm can result from this remedy if judicially practised; conjoining with it at the same time cold sponging of the skin in the morning, and improving the general health by early rising, air, exercise, and attention to diet. (See rules on these subjects in a future chapter.)

150. *Nervous Irritation, Spasm, &c.*—I shall now trace the influence of excitement of the brain and excess of mental employ in developing another class of affections of a perfectly opposite character to that of palsy, though often terminating in that affection; the effect in this case being irritation or exalted action of the part of the brain affected—manifested by neuralgia or augmented sensibility amounting to pain, or spasm of the part to which, by nervous com-

munication, the portion of the brain affected distributes power, as in that painfully acute spasmodic affection of the face and orbit called tic-douloureux. Sciatica is another painful affection of the kind, (located, however, in general in the spine, if it be not in the membranous sheath or covering of the nerve itself,) extending with the nerves from the spinal marrow down the hip and thigh—and affecting in this case the nerves of sensation only: whereas in locked jaw, the seat of which affection is in the summit of the spinal marrow, the part affected is more particularly that from which the nerves of volition arise, (involving therefore probably the cerebellum also,) and muscular rigidity and involuntary contraction of the muscles, or spasms, are developed. I assume that in all these cases, congestion, from whatever cause occasioned, has developed an exalted momentum of blood in the part—increased capillary action—but not to the extent in general of inducing inflammation but a condition bordering thereon, which I have denominated *irritation*. In locked jaw, however, inflamation, I believe, is more frequently developed.

151. *Insanity.*—Having explained what I believe to be the morbid condition of the parts attending those cases of irritation adduced, I will now proceed to describe some other affections of the brain, based upon inflammation or irritation of a part of the brain or its nervous endowments —developing mental delusion or insanity, and implicating in these cases the hemispherical or mental portion of the brain more particularly, though not always exclusively so. The excitement of rage, or immoderate anger, a species of temporary insanity, offers at once a simple illustration of this condition of irritation: here the mental emotion has exalted the circulation of the part directly and immediately, as is evinced by the throbbing of the temples to a degree indicating a condition analogous to inflammation; and its

consequence, namely, perverted sensation and excitement, or insane functional manifestation, or delusion, takes place.

152. On the subject of insanity and its treatment I shall now offer my opinion. In a former chapter I observed, that a timely dose of opium would in many cases of mental disquietude avert this disease. It is obvious that I had in view the premonitory stage of excited intellect, when no positive mental delusion on the part of the individual had become manifest, when the circulation in the organ or part of the brain affected was in the condition of *irritation* alone—that is, before the circulation in the part had become so enfeebled as to lapse into positive inflammation—which becomes the sequel of neglect in all cases, as the subjoined report most irrefragably demonstrates.* With the facts and explanations before us, the indications of treatment are obvious; that is, primarily to subdue irritation;

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* In the last number of the Medico-Chirurgical Transactions, in a Paper on the Pathology of Mental Diseases by Dr. Webster, is a "Report of thirty-six Dissections of Insane Patients recently made at Bethlem Hospital, making, with the seventy-two previously recorded, one hundred and eight autopsies." According to this report, some diseased alteration of structure, more or less evident in the brain and its membranes, was observed in all the thirty-six cases. We have Mr. Lawrence's voucher for their accuracy. "In thirty-three the pia mater was infiltrated; in thirty there was turgidity of the blood-vessels of the brain and its membranes; in twenty-six, effusion of water had taken place in the ventricles; in sixteen, thickening and opacity of the arachnoid; in twelve, fluid at the base of the brain; in nine, the substance of the brain was altered; in eight, patches of bloody points appeared on the medullary surfaces; in five, the medullary or cortical substance was altered in colour to that of pink or a rosy tint; in four, blood was effused in the brain. Thirty cases exhibited disease also of the chest, and twelve of the abdominal organs.—Of the one hundred and eight cases, there was infiltration of the pia mater in ninety-two; turgidity of the blood-vessels in eighty-nine; fluid in the ventricles in sixty-seven; effusion at the base of the brain in thirty-nine; thickening of the arachnoid in thirty-two; bloody points on the cut surface of the medullary substance in twenty-seven; blood effused within the cranium in seventeen."

secondarily to overcome the effect of its continued operation and extended influence—namely, inflammation; and intermediately, both of these conditions. Should, therefore, the dose of opium recommended in the first instance fail in affording permanent relief, which must be the case if the exciting cause—the mental disquietude or perturbation—continue in operation, it will be desirable to continue the opiate, a grain of solid opium every night or half a grain two or three times a day, or an equivalent quantity of laudanum, that is, twelve or fifteen drops; or three grains of the extract of henbane in a pill as frequently may be substituted. In addition to this a warm bath, at an agreeable temperature, for half an hour every evening, will be an excellent expedient; immersing the head, or having the warm water of the bath poured over it from a jug during the immersion of the body. Preceding this, however, should there be pain in the head, and especially if the opiate do not afford relief, some blood should be taken, by the application of a dozen or more leeches to the temples, or back of the head behind the ears, or by cupping the part and taking from eight to sixteen ounces of blood, according to the age and constitution of the patient. Or if there be much heat about the head or intolerance of light, and throbbing in the head and temples,* a bleeding from the arm at once to faintness, if the patient's constitutional powers does not prohibit it,

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* Dr. Clutterbuck in a recent work on Inflammation observes, that in the diseases of infants, if upon grasping the head between our hands we are made sensible of an unusual degree of heat within, it is a ground for suspecting at least inflammation to be going on in the brain or its membranes, or both; and should this be accompanied by increased pulsation of the arteries about the head, and still more, if there be observed any disturbance of the cerebral functions, there is hardly room for doubt; and the same in regard to other parts, that is, where there are increased heat and pulsation in the part, there does inflammation exist.

may be very properly recommended; in either case giving the patient also an active purgative, (three or four grains of calomel in a pill,) and following this up with half a drachm of jalap powder with as much cream of tartar; and if this fails to operate effectually, (the bowels in these cases being in general very torpid,) following it up with the following mixture: half a pint of senna tea, made by infusing half an ounce of the leaves of senna in a trifle more than half a pint of boiling water, and straining off the infusion when cold, and dissolving therein half an ounce of Epsom salts; to be taken in doses of a fourth part every two hours till the desired effect is fulfilled; and continuing this two or three times a day afterwards, or the opiate—whichever of the two may appear to afford the greatest amount of relief; which will necessarily depend upon, and at the same time pourtray, the real character of the disease—whether it exist in the stage of irritation alone, or has extended itself beyond this into the more active condition of inflammation, when the continued application of cold to the head, by an ice-cap (that is, a bladder half-filled with ice) will also be an excellent remedy. It is impossible, therefore, to define the precise mode of treatment required: (in some cases the two may be combined, the opiate by night, and the purgative by day:) this must necessarily depend upon the stage of affection and the condition of the affected organ, which will be determined by the constitution of the patient, the nature of the exciting cause, and the particular circumstances of the case. I must here, however, observe, that the disease may be based upon or connected with a state of general debility; in which case the non-exciting tonics—as cinchona bark, the mineral acids, or the carbonate or other preparation of iron—will be also very necessary remedies in conjunction with the opiate and local remedies (cold applications to the head as one) and a substantial diet. A blister on the back of the neck, or between the

shoulders, will be another very useful expedient in most cases, and if the disease has progressed to the second stage, should be applied continuously to one part or the other alternately: in which stage, also, much benefit may be derived from the vapour-bath, to the extent of producing copious perspiration. If there be much excitement, to the purgative mixture may be advantageously added one grain of emetic tartar—the latter in doses, therefore, of a quarter of a grain every two or three hours, or quantity sufficient to keep the stomach constantly nauseated.

153. Hysterical breathing or other spasmodic affection of the muscles of the tongue, the voice, or those muscles associated in swallowing, (circumstances concomitant with the mental excitement, and connected with the irritation in the brain involving that portion of it from which the nerves of these organs arise—the medulla oblongata and summit of the spinal marrow—inducing the patient to protrude his tongue and to utter discordant sounds, or occasioning a difficulty of swallowing or breathing,) if not to be relieved by a full dose of opium—which should be administered if necessary—exhibit the advanced condition of inflammation, when cupping or leeching the back of the head to a small extent daily, and a blister kept open between the shoulders or behind the ears, are the proper remedies, following them up by the insertion of a seton at the summit of the neck. Spasms of the arms and clenching of the hands are dependent also upon the same cause, and are to be treated in the same way.

154. To these observations, I shall now add the following cases and observations in illustration of my views. They were submitted to the public in the pages of the *London Medical Gazette*, in November 1841, under the title of "Excited Intellect and Mental Delusion," and addressed to the editor. "The subject of insanity is one of great interest, and, in these days of increasing frequency of the disease, of great public

importance; which I trust, sir, will plead my apology for addressing you on the present occasion, with a view of drawing the attention of the profession to the indications of treatment in the like description of cases, and to the simple means successfully pursued in a case which came a short time ago under my observation; and with the view, also, of directing the attention of the public to the importance of an early attention to the progression of the symptoms of an excited intellect—the parent and precursor of insanity—when the disease may be averted, I believe, by very simple means, if carried into timely practice.—" Forester (a man condemned to a prison for shooting at a policeman, as recorded in the daily papers at the time this was published) was said to be an experimental chemist of considerable talent and ingenuity; and who, some months before, had secluded himself from society, had locked and barred himself up for the purpose of carrying on his experiments, and carried loaded pistols about his person for his protection; from which it is evident that he was then the subject of an excited imagination, as well as of such gross delusion, that he was unquestionably of unsound mind; and as such should have been treated by his friends at the time."

155. " *The Essential Character of Insanity.*—The published statement proves to us that the man's mind was devotedly intent, or abstracted, upon some purpose connected with his experiments and his seclusion, and which had produced the usual effects of too intense application of the mind—cerebral excitement, and its insane manifestation, delusion. The effect which ordinarily ensues upon over excitement of an organ is determination of blood to the part; and, the organ here excited being the brain, arterial excitement had become developed in that portion of the brain in which the faculty exercised resided—or inflammation, or a

condition of the blood-vessels of the part affected bordering thereon, (which I designate as *irritation*,) and thus arose the symptoms and their progression—an over susceptible and excited imagination, terminating in delusion.

156. "Determination of blood to the head, terminating in insanity, is a common effect of intense excitement of the mind, whether gradually or suddenly induced. Cases of sudden invasion of insanity from great excitement, as extreme joy or fright, are of frequent occurrence; and madness from unrequited love, or religious fanaticism, are not less so; and that these result from determination of blood developing arterial excitement of the part, is, I am of opinion, clearly manifest by the excitement and delusion evinced in ordinary cases of fever with cerebral determination—or brain fever, as it is commonly called.

157. "The insanity of Forester, and of the late very talented Rev. Mr. Irving, the founder of the Irvingites, are instances of a parallel description: and such cases, if timely treated accordingly—as a physical ailment or inflammatory condition of the brain—are, I believe, as readily curable as other inflammatory affections; and nearly so as the ordinary delusions of fever. But, like other inflammations of a like organic description, they are not so when permitted to become deeply rooted or chronic, when structural derangement—softening of the brain, or other disorganizing process—becomes established in the part, and its consequence paralysis, or confirmed lunacy, follows.

158. "The inflammation which attends fever when the head is affected, is in the membranes of the brain principally, and hence the pain of the head which attends it; but pain, I believe, is little felt when the substance of the brain is affected, further than by the implication of its membranes; so that we must not wait for pain being complained of, as an indication of inflammation, or determination of blood to the brain, nor

expect to find an excited state of the general circulation, as evinced by the pulse; on the contrary, I believe, the pulse will more frequently be found weakly, irritable, or oppressed. Giddiness of head; deafness, or loss of memory; moroseness, waspishness, or irritability of temper, and sleeplessness at night; a contracted pupil, intolerance of light, heat of the scalp, constipated bowels, and defective secretion of urine, are more frequent concomitants.

159. "The case is one of local inflammation, when fully developed, and is confined, we may suppose, in monomania, to a very limited portion of the brain; and which it is obvious we can reach or but slightly influence by our remedies, like most other organic inflammations, only through the medium of the system at large. Hence bleeding, one of our principal remedies in inflammation, to effect its purpose, should be copious; following up the general bleeding by local bloodletting, or, when the latter is interdicted by the constitution and condition of the patient, by cupping at the back of the head, or leeches behind the ears and at the temples; and after this the continued application of cold to the head, with the occasional use of the vapour-bath, (a remedy of considerable importance,) and active excitation of the bowels and liver; following this up by local irritatives—as the constantly renewed application of a blister, or the use of the ointment of emetic tartar. These are the means, aided by the necessary moral appliances to soothe and divert the patient's mind from his abstracting pursuit, which should be simultaneously and early resorted to; following them up, when inflammation of the organ may be supposed to be arrested, by constant exercise in the open air, the amusements of the field, or pedestrian travel, and a substantial, but not exciting, diet. In chronic cases, or the state of more confirmed lunacy, gentle salivation may be tried, succeeded by a succession of small caustic blisters to the scalp, with a seton in the neck, the

occasional use of the vapour-bath, daily relief of the bowels, conjoined with sedatives and a substantial diet: these appear to me to be the necessary expedients.

160. "*Hereditary Tendency to Insanity.*—Insanity is said to be hereditary. It is so, as far as the disposition or constitutional tendency to the disease exists, but no further: and this disposition consists, I believe, in a preternatural weakness or susceptibility to determination of blood and arterial excitement, or inflammatory susceptibility in the lobes of the brain, wholly or in part; and, accordingly, were attention strictly observed to the avoidance of too early or intense application of the mind in the education of a child inheriting such a disposition, as well as to the occupation of such in after life being directed to agricultural or other out-door or mechanical pursuit, and abstaining altogether from spirituous beverages, and every cause of excitement avoided—to which might with advantage be added the use of the shower-bath, and attention at all times to the bowels—we should seldom hear the melancholy recital of several members of the same family being so afflicted.

161. "*Case of Insanity simply and successfully treated.*—I will now mention the case of a medical friend, in which the following simple means, illustrative of these views, were very successfully employed. He is an intellectual man, which in other words is to say, that his mind, if not constantly upon the stretch, is always actively engaged. Devotedly employed in getting up a course of lectures on a subject in which he felt great interest, he exhibited to those around him a good deal of irritability and delusion, in which state he went to Scotland, but returned thence, after lecturing some time, in a much worse condition; exhibiting, indeed, a state of positive insanity, so much so, that he would, in a Christian spirit, pick up in the streets, and bring

home to his wife, half a dozen prostitutes for her to take care of; and, on one occasion, he sold the coat off his back, having no cash about his person, to provide in charity for another poor destitute whom he found in the street. After this he went upon business into Hertfordshire, where, at two o'clock in the morning, he went to a cottager's house, which he contrived to enter unknown to the inmates, went up stairs, and was discovered, by the squalling of the children, in their bed-room, endeavouring to pacify them, having frightened them by his entry. A friend was now obliged to go down and fetch him home, and, on their return, it was advised that he should be placed in confinement: upon the subject of which his wife having called upon me, I expressed an opinion that his case was still amenable to medical means, and, with her co-operation, I would first try what could be done. On his return from Scotland, I had seen him, and advised him to lose some blood, and to take a few doses of calomel and cathartic extract, and his wife urged upon him to do the same, but without effect: he would not admit that there was anything the matter with him. I now provided her with a box of pills, composed of calomel, aloes, and gamboge, and also with a few papers containing three grains of emetic tartar each. One of the latter I directed her to dissolve every morning in his coffee, which being done unknown to him, he was thus rendered very sick. She now urged upon him, seeing how bilious he must be—and sick he really was—to take two of the pills I had prescribed for him, which, when the sickness was at an end, he was prevailed upon to do, and was thus kept at home; and in this way he was physicked for three or four days successively, with some benefit. I now saw him, and knowing his reluctance to lose blood, and his great fancy for baths, I prevailed upon him to go into Argyle Street, and take one of Whitlaw's vapour-baths: this he did, from which he perspired

most profusely, and with so good an effect, that he slept soundly the same night, which he had not done for some weeks before, and with such conscious benefit, that he continued the bath by his own free will, till, in short, he became quite weak from its too frequent use, but with no return of his complaint. The violent perspiration which attended the use of the first bath, his bowels and biliary organs being free, completely absolved him from the delusion and excitement he had previously manifested, and he became now quite sensible of the folly he had been guilty of; and as, four years before, he had been under confinement for more than a year, in consequence of an attack of the same kind, and then had only got well after rambling over the continent of America and by diversified pursuits, he expressed himself highly gratified at the relief he had now obtained."

162. *Remarks on Blood-letting.*—In saying what I have with respect to blood-letting in cases of insanity, let it be understood that I do not recommend the indiscriminate use of the lancet—far from it, my object has been rather to exhibit what appear to me the true indications of treatment; and in so doing, I could not say less than I have said with respect to this remedy—the insane manifestations of the mind presenting themselves to my perception, as based upon a condition of the brain which is in its character essentially inflammatory, as the post-mortem examinations of the insane most indubitably prove—thickening of the membranes, serous exudation, and *ramollissement* of the brain, being, with few exceptions, invariably discovered. But I nevertheless know, that this inflammatory irritation may be so circumscribed in character, and centrically located, or limited in degree, that the fulness and action of the vessels of the part affected could not be influenced to any very sensible degree, or to an extent capable of fulfilling its resolution, by any quantity of blood we should be justified in

taking from the patient. And it is further true, that inflammation may exist, and be located in this or other organ of the body, in a person whose constitution has been in other respects debilitated by the want of sufficient nourishment and other reducing agencies, and whose condition accordingly does not admit of general bleeding; but who nevertheless, were the inflamed part so located that it would be amenable to local depletion, would be benefited by its adoption. The indication is, therefore, as I have stated it to be; but the condition of the patient may forbid it. It is further true, that uterine or other organic irritation may exist, and reflectively induce the mental affection; but this I do not believe would be the case, unless the predisposition existed, or inflammatory susceptibility of the brain were coincident.

163. *Moral Treatment of Insanity: Exercise, &c. &c.*— I have hitherto said nothing on the subject of the moral means of treating insanity—a description of agency I hold nevertheless to be of first-rate importance, inasmuch as the diverting the patient's mind, and drawing his attention to other subjects and thoughts into a new train of ideas, is, in fact, withdrawing excitement from the part affected, and locating it for the time in a different portion of the brain, to the relief necessarily of the part affected. And as we know the continued emotion of one train of thoughts will eventually produce preternatural excitement in the blood-vessels of the part, and occasion the disease, so the introducing a new train of ideas, and thus transferring emotion and excitement from the diseased part, may operate in like manner, and eventually arrest or palliate the disease. This I believe to be the true principle—that of derivation; upon which principle moral means are found useful, in like manner as physical agents are found to be efficacious in a similar class of affections: thus a blister is applied on the chest when the lungs are inflamed, with the intention of inducing inflam-

mation in, and transferring it to, a part of secondary importance, in relief of the one affected. Occupation for the insane is a measure of like character, with additional advantages annexed, when accompanied with prolonged muscular exercise, as in digging, and the employments of husbandry—a carpenter's shop—long walks, or pedestrian travel; all of which expend power, and engage it on the muscular system in relief of the brain.

164.—From what has been said, it must be obvious of how much importance it is that every cause and occasion of mental irritation, or excitement of the patient, should be avoided: he should in no instance be contradicted or thwarted in any way, but be led by gentle and persuasive means to both think and act rightly. Experience must have proved to any person of ordinary observation, that an angry person is never to be pacified by opposition, but generally to be soothed or quieted by forbearance, till the cloud which obscured his reason has passed, when his mind returns to sanity, and he may be reasoned with. It is precisely the same with the lunatic: while the fit is upon him, (which in general is more or less periodical, and dependent upon the state of the atmosphere, the condition of his bowels, or other circumstance,) it is in vain to reason with him about his absurdities, or oppose him when excited: on the contrary, he should be calmed by soothing and indulgence; though the shock of a shower-bath, (if he is willing to allow of it,) active purging, copious sweating by the use of the vapour-bath, leeches to the temples, or a blister to the head, with a large dose of opium,—one or other, or a combination of these means, according to the circumstances of the case and the condition of the individual, may afford great relief. The necessity for them should, however, rather be anticipated than have to be now provided for. And finally, when the paroxysm is at an end, and the patient calm, all

the appliances for improving the general health and renovating the system, as will be pointed out in a future chapter, should be diligently carried into practice; and these are not incompatible with the continued use of a seton, which in many cases may be conjointly employed with much benefit, until the health is established.

165. Of the treatment of tic-douloureux, sciatica, and other forms of neuralgia, I shall speak hereafter, when treating of the more frequent causes of these affections. Having completed my analysis of the diseases of the brain, and the more frequent forms of nervous affection, including those of the heart, I shall now proceed, in continuation of the subject of dyspepsia, to treat of the further disorder and disease of the stomach and bowels, and the organs, associated with them, of assimilation and secretion.

CHAPTER VIII.

OF THE DISORDERS AND DISEASES OF THE STOMACH, BOWELS, LIVER, AND KIDNEYS; AND THEIR CONSEQUENCES, GOUT, SCIATICA, PILES, AND SOME AFFECTIONS OF THE SKIN, BLADDER, WOMB, &C.

166. *The Stomach; its Disorders.*—The most frequent cause of disorder of the stomach is the quantity of food being in excess, or its quality being objectionable, and thus exceeding the functional or digestive power of the stomach; the capabilities of which must necessarily be proportionate at all times to its nervous endowment or electrical excitement, and to the general tone of the muscular system, in which the stomach, as a partially muscular organ, will participate. The

especial symptoms which this species of disorder will give rise to, will necessarily be those of indigestion, or, in other words, digestion more or less imperfectly performed: hence, from the undue retention of the food in the stomach, and changes of fermentative character, which under these circumstances will take place in its substance, arise the gases which become evolved, and the distension and flatulence, and sometimes pain, as well as acid eructation, and nausea or sickness that ensue. And the stomach's disorder reacting upon the brain, through the medium of its nervous connexions, and imperfectly assimilated blood, will occasion head-ache, languor, and oppression, with a cloudy conception of mind, and benighted perception.

167. *Effects of Indigestion.*—The above are the especial symptoms, or direct effects of indigestion. The undigested acid material, passing from the stomach into the bowels, now affects them in turn; occasioning in some cases spasmodic or colicky pains, and in others flatulent distension of the bowels, or purging, and ultimately, if this deteriorated process of digestion be the constant condition, from the absorption of these imperfectly assimilated materials into the blood, and the disorder of the secretive organs which must ensue, a host of ailments, in the shape of gout, rheumatism, cutaneous diseases of various kinds, as well as tic douloureux and other spasmodic affections. The treatment of all which affections, I may here, *en passant*, observe, must necessarily be based upon one general principle, namely, the restoration of the general health; seeking this, however, through the purification of the blood, and the correction of the special derangement which has given occasion to its impurity and disorder.

168. *Congestion of the Stomach.*—Another cause of derangement to which the stomach is liable, is congestion, or a plethoric condition of the veins of the stomach, occasioned in most cases by obstruction in the liver; the blood, it will

be remembered, having to pass from the stomach and bowels, on its return to the heart, through the liver. The congestion, or cause of the stomach's derangement in this case, having its seat in the liver, we shall defer what we have to say on this subject till it comes more prominently before us in considering the diseases of that organ.

169. From the above statement it may be readily apprehended, that with the exception of any disease of a specific character, such as cancer, the disorders and diseases of the stomach and bowels are at all times secondary, or associated with those of the liver. And this being the case, to comprehend the diseases of the former, some previous knowledge of the latter is indispensable; and accordingly, I shall here introduce just so much of the subject as is necessary to the understanding of that which is here more immediately the object of our attention.

170. *Torpor of the Liver, and its Effects.*—Torpor of function is the first and most frequent form of derangement of the liver, dependent in all cases upon *enervation* primarily or secondarily induced. Primarily, from defect of electro-nervous excitement, as I have previously pointed out; or secondarily, from congestion of the organ, however occasioned—distension of the blood-vessels of the liver necessarily producing oppression and torpor, or defective secretive function. And as defect of function, and relief thereby of the organ of the amount of fluid which should have been secreted, must tend still further to augment the congestion, or occasion it where it did not previously exist, there will also necessarily ensue a remora, or plethoric fulness of the veins of the stomach, bowels, and spleen, to some extent, as these vessels all unite in bringing their blood to the liver. Added to which the blood, returning to the heart from the liver, loaded with the new juices or alimentary fluid imbibed from the stomach and bowels, and which are in consequence of the liver's torpor but imperfectly assimilated and purified, a host of

derangements will further ensue from this cause. Torpor of the liver will necessarily be attended with torpid bowels, from the want, not only of their natural stimulus—bile, (which should be poured out into them from the liver, and is the ordinary cause of their excitement,) but from another cause also, namely, these organs all receiving their nervous supply from the same source; and if this be deficient, as it is, in respect to the liver, it must necessarily be so as regards all the rest, and torpor, with congestion of the bowels, will take place, abounding in consequences hereafter to be pointed out and explained.

171. *The Cause of the extreme Frequency of Liver Complaints.*—Congestion of the liver will occur to a greater or less degree from every cause interrupting the balance of the circulation. That is to say, whenever the motive power is not equal to the resisting power, or, in other words, when the quantity of blood to be circulated is in excess of the power of the heart, plethora or congestion of the liver, more particularly, will ensue; the blood being circulated to every other part of the system directly to and from the heart, by the power or active momentum of that organ, aided by the action of the capillaries in the extreme vessels; but with respect to the liver, it has to be first circulated through the vessels of the stomach, bowels, and spleen, and moreover, as the blood is venous, without the aid of capillary excitement. Consequently, the circulation in the liver, compared to what it must be in every other part, must of necessity be of an exceedingly feeble description, and therefore, (whatever may be the cause of the reduction of the heart's power,) here will remora and congestion take place. In short, did not a safety-valve of this kind exist, rupture of the blood-vessels or exudation from them would be a constant occurrence from the most trivial cause of the heart's depreciated power. The spleen, however, from its connexion with the liver, and its distensible character, must of necessity become engorged

also; but as it has no secretive or other important function to fulfil, this is of very secondary consequence. Hence the frequency of liver torpor and derangement; for it is obvious that no disorder of the system can take place without being productive of debility of the general system, involving necessarily the heart's power, and thus deranging the balance of the circulation, and inducing congestion of the liver and its consequences—disorder of function and deranged secretion; and hence the universality and utility of the celebrated Abernethean remedy—blue pill and its consort calomel.*

* Seeing how important the action of the capillary vessels is to the circulation of the blood in general, and especially so when we consider how remote the heart's power in the extremities is to the column of blood to be moved by its agency, it has always been a matter of astonishment to me how the circulation in the liver could be effected at all; seeing that the blood for circulation through the liver, furnished by the portal vein, is venous, and therefore deprived of its especial vital properties, or, in other words, devoid of oxygenous particles—the essential qualifications to chemical action and capillary excitement. But since these pages have been in the hands of the printer, light has broken in upon my understanding, and I am of opinion I can now see clearly what had appeared to me so mysterious; and which I shall now explain. Majendie, who analysed the gases contained in the stomach and bowels of three criminals immediately after execution, found in the stomach of the first, who had taken a meal an hour before, eleven per cent. of oxygen, with seventy-two of nitrogen, and fourteen of carbonic acid. The intestines contained no oxygen, and but twenty per cent. of nitrogen. In the second, who had taken a meal two hours before, the intestines contained no oxygen, and but fourteen per cent. of nitrogen; the remaining gases being carbonic acid and hydrogen. In the third also no oxygen was discovered, but about fifty per cent. of nitrogen in the bowels. Now when the fact, that oxygen was found in the stomach but not in the bowels, is taken into consideration, coupled with another, that in the process of mastication much air must be combined and swallowed with our food, and with the saliva we are constantly swallowing, and in combination also with cold water, which in common with the rest of the animal creation is man's proper beverage; here it will be obvious is an abundant source of power. The surface of the stomach and bowels, like the cutaneous, I should therefore say is a respiratory surface; and with the absorption of the food by the veins and lacteals on their surface, oxygen is also imbibed; and chemical action is thus induced in the contents of these vessels, and excitement imparted thereby not only to the capillary vessels of the liver, but to the lacteal absorbents also. And these views are confirmed, I am of opinion, by the fact, that ruminating animals, which are all vegetable feeders, and require therefore a larger amount of food and an

172. *Treatment of Indigestion.*—The general prineiples to be pursued in the treatment of the disorder of the stomaeh first mentioned having been in a former ehapter, under the artiele Dyspepsia, already detailed, I have here only to add, that when heartburn or aeid eruetation is experieneed, in addition to a pill of ealomel and aloes being taken every night, the following mixture may very advantageously be conjoined: one draehm of earbonate of soda, with three draehms of sulphate of soda, dissolved in half a pint of the infusion of gentian or easearilla bark, a fourth part to be taken two or three times a day. In some eases, as gentle tonies, the mineral aeids are found more sueeessful, in the proportion of twenty drops of the nitrie, or diluted sulphurie acid, in half a tumbler of eold water three times a day; avoiding at the same time fruit, vegetables, tea, and other sugared slops, or whatever else the individual's observation may point out as objeetionable to him; and being partieular also to well mastieate his food. The improvement of the general health should also be provided for by attention to air and exereise, and the use of the eold bath; and for reasons whieh will appear obvious on reading the note appended to the last paragraph, eold spring water should be the ordinary beverage.

173. Another eause of the stomaeh's derangement I have shown to eonsist in a eongestive eondition of the blood-vessels of that organ; the symptoms being those of indigestion, or prineipally so. The appetite is, however, in sueh eases, often eraving or eaprieious rather than defieient, and after meals there is a sense of heat and pain in the stomaeh; or a degree of siekness is experienced, and

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increased supply of oxygen for the maintenance of a more active condition of the liver and lacteal absorption, in chewing the cud, thus obtain the oxygen required, animalizing the product at the same time by the nitrogen also acquired. Another corroborating circumstance I may mention is the fact, that the vegetable-feeding insects, requiring a larger amount both of oxygen and nitrogen than the carnivorous, have, in addition to the air-tubes possessed by insects in common, air-cells permeating their structure.

often pain also upon external pressure. The cause of the stomach affection being obstruction in the liver, the pills of calomel and aloes are clearly indicated; and in addition to one of them being taken every night, the bowels should be kept loose by a teaspoonful of Epsom or Glauber salts every morning, or the mixture of the salts and soda previously recommended.

174. Should relief not be obtained after a week's trial of these means, bleeding should be had recourse to; or, should there exist any tendency to piles, or pain in the stomach on pressure, or the breathing be oppressed, it should be adopted in the first instance. Twelve ounces or more of blood may be taken from the arm, and again a week after if necessary; or, the same quantity of blood may by leeches be taken from the anus (or fundament), for which purpose a dozen should be applied around its margin, and as near to the aperture as possible. When the leeches come off and their bites have been sponged, the patient should sit over a close-stool, into the pan of which a couple of quarts of hot water should be previously poured and a slop-basin be placed,—the latter (which will float on the water) to catch the blood, and the former to impart its steam to the leech-bites,—the steam, and the position of the patient, facilitating the flow of blood. After the bleeding has been completed, a warm bread-and-water poultice should be applied, to prevent the leech-bites becoming inflamed, and repeated some hours afterwards, the patient confining himself to the recumbent posture during the time.

175. *Piles, Fistula, and Diseases of the Bladder and Womb.*—A common consequence of congestion of the bowels and torpid liver, when of long standing, is piles; which are nothing but small tumours formed by distended blood-vessels around the external opening of the bowels—the blood gravitating to the most dependent parts, and forming these

tumours: they generally burst and discharge blood, and occasionally very copiously, Nature, with her usual providence, in this way attempting her own relief. When they do not burst, they constitute what are called blind piles, and from their situation and connexion frequently become inflamed, and thus are abscess and fistula developed. The congestion of the veins of the bowels in other cases implicates those about the neck of the bladder in the male, and occasions spasmodic stricture on the one hand, and enlargement and disease of the prostate gland or an irritable bladder on the other, to which persons at a certain period of life are so liable; or, in the female, congestion of the neck of the womb and leucorrhœal discharge, or other affection of some kind of the womb or its appendages, often takes place.

176. With respect to piles, I have only to add, that leeching the bowels in the way I have pointed out, and otherwise treating them as affections dependent on and connected with congestion of the bowels and torpor of the liver's function, is the best and most proper method of treating them; and to these subjects I must accordingly refer the reader, more especially as the treatment indicated therein, applies directly to the removal of the cause of this disorder. And I may with equal justice say the same in regard to the numerous other affections adverted to, namely, spasmodic stricture either of the bowels or urethra; enlargement of the prostate gland, or irritable bladder, in the male; as well as leucorrhœa, (or whites as the discharge is called,) or other affection of the womb or its appendages, in the female; neglect or ignorance in respect to which affections in their early manifestations giving occasion to so much suffering and loss of life at after periods; but which will all readily give way to the judicious employment of the means adverted to, if early employed, and aided by the usual local appliance each case may require.

177. *Diarrhœa, or Relaxation of the Bowels, and its Treatment.*—A frequent ailment of the bowels is diarrhœa, or looseness. This may happen, as I have before observed, as an effect of disorder of the stomach—of irritation imparted to the bowels by acidulated and imperfectly digested food: unripe fruit, nuts, veal or pork in some persons, or any other indigestible or unwholesome substance, will occasion the same result. This is another display of the vis medicatrix naturæ, or provident means of preserving the system from injury. Vomiting, also, is often excited by the same causes operating in a more aggravated degree, and with the same provident intention. In short, Nature in all derangements of the system attempts her own relief, and half the symptoms connected with disease are but the manifestations of her efforts in progress towards that end; and which it is accordingly the duty of the physician—the helper of Nature—to aid and support, and occasionally to moderate, but seldom to act in opposition to or suppress. In accordance, therefore, with the indications of Nature, the treatment in these cases of relaxation of the bowels from indigestion and irritation are gentle aperients—such as rhubarb, magnesia or castor-oil, followed up after sufficient evacuation by a few drops of laudanum, say from twelve to twenty drops,—supporting the system at the same time with a little spiced broth, beef-tea, or other light fluid nutriment of the same kind. An emetic, likewise, (consisting of a grain of emetic tartar dissolved in a tablespoonful of hot water, repeating it ten minutes after if necessary—or twenty grains of ipecacuanha powder,) is another remedy often of much benefit. Nature points out this for our adoption—the cause in operation in an aggravated degree being in general attended with vomiting—with the view, not only of removing the offensive substance from the stomach, but with the intent also, by the excitement of vomiting, of imparting

to the liver and connected organs, increased secretive power and energy of circulation, and thereby preventing what is otherwise liable to occur—namely, inflammation of the stomach and bowels from venous congestion, as we see occasionally exemplified after inebriation. And in furtherance of the same intention, of increasing the circulation through the liver, calomel is also a most useful remedy. Should the disorder continue in despite of an emetic, calomel in conjunction with a little opium to allay irritation and secure a little rest to the patient, will fulfil every indication. Some pills, therefore, consisting of a grain of calomel with a third of a grain of opium in each, taking one every two or three hours for three, four, or more doses—according to the necessity of the case, husbanding at the same time the powers of the system by the recumbent posture and a warm bed—will soon restore the patient to health.

178. *A severer Form of Diarrhœa and Cholera.*—There is another cause of relaxed bowels, very common in damp weather, developed by the agency of cold upon the system. Cold checking the functions of the skin, and the exhalation therefrom of the perspirable secretion, becomes the cause of engorgement, and of torpor of the function of the liver, for reasons already given; and in consequence of the retarded passage of the blood through that organ, and distension at the same time of its vessels and those of the bowels, arising from the non-exhalation from the cutaneous surface, a serous or watery exudation from the veins of the bowels succeeds; and thus the watery purging; and if this implicates the vessels of the stomach, nausea or vomiting also follows. This is more common in autumn, when vicissitudes of temperature are greater, and the system, from the previous effects of heat upon the cuticular and liver function, is predisposed to congestion and derangement. And occasionally, when cold thus operates, in conjunction with malaria, which

in some seasons and situations abounds, the conjoint effects develop a highly aggravated affection of the same kind, called cholera; the characteristic symptoms of which are the following: watery purging, more or less colourless according to the severity of the disease. As the colour imparted to the evacuations in health is due to the biliary secretion, its presence here necessarily indicates a less amount of arrest of this function and consequently less disease. Vomiting, from implication of the stomach, is necessarily a frequent concomitant symptom; and there is in general also great debility, with giddiness and prostration of all the functions or active powers of the system; and a proportionate reduction of the temperature of the body, or coldness. Cramps or spasms of the bowels or extremities are frequent symptoms, and if the disease is very severe suppression also of the urinary secretion.

179. *Treatment of Diarrhœa.*—And now what are the indications of treatment? In the minor ailment or simple form of affection from cold, these consist principally in restoring the functions of the skin; for which purpose the patient should betake himself to a warm bed, and take thirty or forty drops of antimonial or ipecacuanha wine, with eight drops of laudanum, in two tablespoonfuls of water, every two hours; with a cupful of warm barley-water, thin gruel, or wine-whey between the doses, till perspiration is induced; when a grain or two of calomel should be taken to secure the integrity of the liver's function; and this being effected, (which will be indicated by bilious evacuation of a yellow appearance,) nothing further will be required than attention to diet. Or instead of the antimonial wine, the following pills may be substituted, which will fulfil all the indications: calomel eight grains, opium and emetic tartar, of each two grains; made with conserve of roses into twelve pills—one to be taken every two hours till

perspiration is induced and the stools are bilious. Should vomiting be induced by either the pills or the drops, the intervals between the doses may be prolonged to every third hour.

180. *Chronic Diarrhœa.*—A chronic relaxed state of the bowels is another condition connected with biliary derangement; the patient having two, three, or more relaxed evacuations in the twenty-four hours, not unfrequently occurring at an early hour of the morning before rising. This is a curative effort of the system in relief of abdominal plethora. The treatment accordingly should be in furtherance of these intentions, leeching the anus in the way I before pointed out, once, twice, or oftener if there be pain on pressing the abdomen, or straining at evacuation; or bleeding from the arm will answer the same purpose, taking at the same time a pill of one grain and a half of calomel in combination with half a grain of opium and as much ipecacuanha powder, every night, and in the morning also if pain in the abdomen be a constant symptom, with an occasional dose of castor oil, and a diet of light puddings, rice, and food of the like farinaceous description. In these cases it will be often well to continue the pills till the gums become tender, or if the disease has been of lengthened continuance, till gentle salivation is induced, as a low form of inflammation, terminating in ulceration, is no uncommon effect, which may be by these means averted.

181. *Treatment of Cholera.*—And now what are the indications of treatment in the severer form of affection of the bowels by cold and malaria? They are obviously the restoration of the functions of the liver and skin, or principally so,—the depressing influence of malaria on the system, one of the elements of the disease, being best averted by the remedies to be employed in fulfilling these indications, (seeing that fever is not developed,) and which are princi-

pally warmth and calomel—the most potent of all stimulants, as I have elsewhere attempted to render apparent. A comfortable warmed bed and an emetic should precede all other remedies,—the emetic for the purpose not only of assisting nature in her efforts to remove obstruction and increase the secretive function of the liver, but for the purpose also of clearing the stomach and bringing our remedies in immediate contact with its surface in furtherance of their absorption, which from the congestion of vessels (which in these cases is considerable) is proportionately diminished. And bleeding where there is pain in the stomach, with vomiting or oppression of breathing, should be practised, taking the blood in small quantity at a time, and at short intervals, till these symptoms are relieved. Soon after the operation of the emetic, the calomel must be given, which, as the absorbing power of the stomach is reduced, and the susceptibility of the system to influence diminished, must be in doses proportionate thereto, and to the emergency of the case; and with the view of allaying irritation and husbanding the powers of the system, combining with it a little opium. In these cases, therefore, six grains of calomel with half a grain of opium, given in powder that it may be diffused over a great extent of the stomach's surface, will not be too much, and half or one third of the same dose may be repeated every hour or two afterwards, till the patient is relieved, and then continuing it at longer intervals (say four hours), and without the opium, till bilious evacuations succeed; and when this takes place, at still longer intervals, till healthy yellow-brown bile appears in the evacuations, when a dose of castor-oil or other mild aperient, to prevent any further effect from the calomel, will be all that is necessary;—conjoining with these remedies, however, in the early treatment, if there be much exhaustion, light cordials—as spiced negus, or warm brandy-and-water, or the like, but in very small quantity—a tablespoonful or

two at a time—to prevent puking and oppression, till relief is obtained; and when desire for cold water is experienced, substituting this or barley-water in small quantities at the pleasure of the patient, and attending at all times to nature's indications, though also at the same time observing moderation. A large mustard plaister over the region of the stomach and liver is often a useful auxiliary. For this purpose some fresh-made mustard as for table use, but a little more fluid, should be spread upon a napkin, and when applied to the part kept on for twelve or fifteen minutes, or as long as can be conveniently borne by the patient.

182. *Fever succeeding to Diarrhœa.*—In a severe affection of the kind arising from malarious influence, after the secretions from the bowels have become healthy, it will be proper to follow up the treatment with a decoction of bark to the extent of half a pint a day—a quarter part being taken at each dose—or an equivalent quantity of the salt of bark, sulphate of quinine, that is, three or four grains, in doses of a grain either in powder or made into a pill, three or four times a day. This is recommended with the view not only of giving tone to the system, but also of preventing the development of fever, which malaria very generally gives rise to after the bowel affection has been controlled, and which in the early stage of these cases, being of a low remittent character, and coming on once or oftener in the twenty-four hours, is so obscure, that it is only to be detected by the professional attendant being widely awake to the probability of such an occurrence; and which undetected and allowed to progress (which is frequently the case) develops low inflammation and ulceration of the mucous membrane of the bowels in the parts first affected with congestion, and now attended with typhoidal fever. But for further information on this head, see what is said in a subsequent chapter on the subject of malarious fever.

183. *Cholera Morbus, or Bilious Vomiting and Purging,* will be treated of as an affection of the liver.

184. *Constipation and Inflammation of the Bowels, and their Treatment.*—An opposite class of symptoms sometimes arise from the effect of cold upon the bowels, giving rise to constipation and inflammation; dependent no doubt upon the particular circumstance of exposure, predisposition, and constitutional susceptibility of the individual; whereby, instead of exudation following, to the relief of the congested and obstructed vessels, inflammation in the substance of the bowels is developed, implicating, at the same time, in most cases, the peritoneal or outer coat of the bowels: hence the pain in these cases, constipation and tension of the bowels, and, from connected implication of the stomach, the vomiting also that so generally ensues. The latter is no doubt intended for the protection of the bowels from further irritation, which would attend the introduction of food or aught else into them, as well as for the excitement of the liver and the circulation of the blood through that organ, in relief of the bowels; everything in most cases being rejected, with the exception perhaps of a little cold water, for which there is often great desire expressed. The treatment indicated is evidently the removal of the root of the offending cause, the distension of the blood-vessels of the part, and inflammation, or increased action of the vessels, which it has given rise to. The distension of the veins in this case preventing the free admission into them of the blood from the capillary arteries, these become distended and excited to increased action, or inflammation, to remove the obstruction, a curative effort next in the series of events to the exudation which occasions diarrhœa. The removal of the distension of these vessels, which gives rise to the disease, experience proves is best effected by a copious bleeding from the arm, following this up by the application of

twenty leeches or more over the seat of pain; and, on their removal, immersion in a warm bath, at a temperature of ninety-eight, or that most agreeable to the feelings of the patient, for twenty minutes or more, following this up by the continued application of a warm bread-and-water poultice over the whole seat of the affection; or, what perhaps is better, a soft towel wrung out in hot water, and over this, to prevent cold by evaporation, several folds of flannel; occasionally renewing it, and never allowing it to become at any time unpleasantly hot to the feelings of the patient. With the view also of increasing the circulation through the liver, and thus relieving the congested vessels of the bowels, calomel, conjoined with opium, in the proportion of two grains of the first with one third of a grain of the latter, will be very proper remedies, administered every second or third hour, till bilious stools are obtained, when a weak solution of Epsom salts may be conjoined. The patient during the period should take nothing but a little barley-water, gruel, or the like, and these in quantity not exceeding two or three spoonfuls at a time; which, however, may be frequently repeated, according to the dictates of nature and the desire of the patient. In addition to the foregoing means, a clyster of barley-water or thin gruel may be often advantageously employed, especially if the stomach is very irritable, repeating the same every two hours, or oftener. But no purgative or other irritant should be administered, either in this way or by the stomach, till bile is secreted; the constipation not being the cause in these cases, but the effect of inflammation. And here let me observe, that even in cases of inflammation of the bowels which may be supposed to arise from constipation, I believe the following rule will hold good—that it is in vain to attempt the relief of the constipation till inflammation has been subdued; and the best means of accomplishing this end, are those I have already pointed out; and

which, indeed, go directly to the relief of the constipation by increasing the biliary secretion, the defect of which, in most cases, being in reality, I believe, the cause of the constipation.

185. *Importance of Active Measures in the Treatment of Acute Inflammation.*—In severe cases of inflammation, in addition to the means enumerated, should the symptoms justify the measure, (that is to say, should the pain of the bowels and vomiting continue, the pulse at the same time being tense and wiry,) the bleeding from the arm should be repeated, and the blood be taken from a large orifice, to the effect of inducing fainting; and for this purpose, when the bowels have been long constipated, the patient should be taken from bed, and be made to walk; and being thus bled, fainting is sooner induced, and with it I have often seen the bowels spontaneously relax, and pour forth their contents. Applying a dozen leeches to the anus, is also another excellent expedient in these cases, encouraging a flow of blood from the part, after the removal of the leeches, by the application of a warm poultice; but this will not supersede the necessity for the general bleeding in severe cases.

186. After a few doses of calomel have been taken, it sometimes happens that, from a flow of bile into the irritable bowels, considerable griping pain is induced: this must not be mistaken for increased inflammation; it is best relieved by a frequent clyster of warm gruel, or a small dose of castor-oil, in substitute for a dose or two of the calomel, but which must be still continued till the secretions become of healthy appearance; the bile in these cases being, from long previous retention in the gall-bladder, often exceedingly dark, acrid, and unhealthy.

187. Again, in a less severe form of affection, the application of the leeches alone in sufficient number, followed up

by the warm bath, or the poultice to the abdomen, and the calomel and opium, is all that may be required. But in so saying, let me be understood to signify, as the fruit of long experience, that it is infinitely better to do a little more than is absolutely indispensable in the early treatment of all cases of active inflammation of the organs of life, rather than one particle less than is necessary: the evil consequence in one case being, only a little temporary debility, but in the other, too frequently the loss of life—unsubdued inflammation of the bowels, if of an active character, terminating in mortification, and when of a subdued form, in ulceration. As there are no other remedial measures that can be pursued with reasonable hope of success, than those I have pointed out, excepting the application of a blister over the whole region of the bowels, which in protracted cases is often of much benefit, these must be steadily pursued in a ratio to, and commensurate with, the severity of the case and the emergency of the symptoms.*

188. *Treatment of Inflammation of the Spleen, Bladder, Kidneys, Womb, &c.*—The same treatment and the same observations are equally applicable to inflammation of the stomach, and of the liver, the spleen, the kidneys, the blad-

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* The talented and experienced surgeon, Mr. B. Travers, F.R.S., in his late work on Inflammation, justly observes, "In visceral inflammation venesection is indicated and warranted to the utmost extent that the powers of life will bear, for here the mass of blood is so altered and spoiled for its proper and healthy purposes by the direct implication of the blood-making and preparing organs in the disease, that relieving the system of its presence, to the full extent that it can be borne, is the main resource we possess for its preservation. A freer circulation through the small vessels, and those of the excretory glands especially, ensues almost immediately upon a full bleeding; and the inflammation, if not really abridged by its effects, is disposed to a kindlier termination."

der, the womb, the peritoneum, and, in short, to inflammation of all and any of the abdominal organs. The symptoms of course will be modified in character by the particular function and locality of the organ affected; but they will be alike in kind, attended with pain, suppression of function, and in general with vomiting; Nature, with her usual providence, interposing her shield, and rejecting everything that might prove injurious or augment the mischief. The pulse, too, will be accelerated, and the skin hot; in short, fever will be concomitant, and in general commensurate with the extent and severity of the inflammation in its acute stage, and so long as bleeding is advisable in its treatment; but not so in the more advanced stage of its progress, the pulse then becoming soft and subdued, and the skin perspirable.

189. Extreme excitement is invariably productive of suppression of function. This holds good, I believe, in all conditions of the system, mental and corporeal, as I have elsewhere pointed out. And thus the secretive function of the liver is suppressed in inflammation of that organ, and that of the skin in the hot stage of fever. Accordingly, in all cases of acute inflammation in which the stomach admits of the remedy—that is to say, when there is no vomiting, but heat of skin and excited pulse—advantage will be derived from combining with the calomel and opium a minute portion of tartar emetic, a quarter or the sixth part of a grain with each dose, or half a grain of ipecacuanha powder, which will, by its depressive influence on the system, moderate the heat and excitement of the circulation, and be productive thereby of perspiration; and thus, true to nature's indications, tend considerably to the relief of the local affection. And with the same view of reducing excitement, a tablespoonful of the liquor of acetate of ammonia, or a scruple of saltpetre in a wineglassful of water,

may be also advantageously given between the doses of the pills aforesaid.

190. Premising, however, that in all cases wherein the stomach or bowels are not the immediate seat of the disease, (where they are, a frequent clyster of warm gruel should be substituted,) a mild but active purgative, should be administered, with the intention of relieving the bowels from any feculent accumulation, and of removing from them any cause of irritation. With this view, an ounce of castor-oil, or an infusion of senna with salts, or a purgative of the like description, should immediately follow the bleeding; the calomel and opium of course being omitted, till the purgative has effectively operated.

191. In inflammation of the bladder, the irritability of the organ is so much increased, that it loses its power of retaining the urine, and there ensues a constant desire for its expulsion; its passage is attended with a sense of scaldings, and sharp pain on the expulsion of the last drop is felt at the extremity of the urethra. The treatment in this case, in addition to the pills of calomel, opium, and emetic tartar, previously recommended, and an occasional dose of castor-oil, consists in leeching freely the perineum and pubes—the parts immediately above and below the organs of generation: this should be succeeded by immersion in a warm bath for half an hour or longer, and after this the renewed application of a warm poultice to the leech-bites; the patient also drinking abundantly of barley-water, linseed-tea, or other demulcent fluid. After the acute symptoms have subsided by these means, the application of a blister to the sacrum or bottom of the spine, will prove an excellent remedy.

192. *Gravel and Calculi; their Cause.*—There are many other affections of the kidneys besides inflammation, a few of which, of more common occurrence, I shall now briefly notice. The office of the kidneys is to eliminate or divest

the blood of certain impurities, chiefly of a saline nature —urea and uric acid more particularly—the products of the combustion of the refluent matter of animal substance and worn-out particles of the system, or the combination of their nitrogenised particles with the oxygen of the blood; and which being thus held in watery solution, constitute urine. These and other salts contained in urine are soluble in a certain amount of water, and when secreted by the kidneys, and retained any length of time in the bladder, if the urine when secreted was saturated with the salts, and absorption of any portion of the water by the bladder should take place, which is commonly the case, (and hence the higher colour and greater specific gravity of the urine in the morning, from its retention during the night,) the salts become in excess, and are precipitated, and occasion the deposits of gravel and calculi, or stone, which take place in the bladder. As the solubility of these substances is in general proportionate to the temperature of the fluid, we often notice their deposition in the chamber utensil after the urine becomes cold;—an occurrence which, *en passant*, I may notice, pretty clearly points out, that the individual would be benefited by a greater amount of watery beverage.

193. *Gout, Rheumatism, Sciatica, and Cutaneous Affections; their Causes.*—Returning now to these products, urea and the other saline substances formed in the blood: if the quantity exceed the secretive and depurative office of the kidneys, it abounds in the blood, and becomes, during its circulation through the system, a cause of irritation and excitement to the fibrous and nervous tissues more particularly; developing gout, rheumatism, and a variety of other painful and spasmodic affections, of which this is therefore not unfrequently the cause.

194. The kidneys, therefore, are liable to torpor and other

derangements of function, as well as disease of structure. The secretion is also liable to be deranged in kind, by the condition of the blood abounding in certain particles (as I have just explained) or other elements which should have been eliminated either by the liver or the skin; or resulting from the imperfect assimilation of the food by the digestive organs; and thus again are gout, sciatica, or rheumatism, or diabetes and the like affections, induced, as well as many eruptive and other cutaneous diseases occasioned; and again, from these causes being singly or conjointly in operation, or modified and augmented by irritation existing in or being extended to the source of nervous power, (by which I mean the spinal marrow or brain,) not only sciatica and tic douloureux, but a complexity and variety of painful and spasmodic affections which prevail, may thus date their origin.

195. *Albumenaria and Congestion of the Kidneys.*—Congestion is another affection to which the kidney is subject, and a frequent cause, no doubt, of albuminous urine, which is a serous exudation from the congested vessels rather than a secretion of the organ. Hence it so frequently marks a degeneration of the structure of the kidney, which Dr. Bright has taught us is so frequent a cause of death. The cause may be either cold, or the exhaustion succeeding to the habitual excitement of the organ by spirituous beverages. It often exists without pain, further than by a sense of lumbago or rheumatic pain in the loins—which accordingly should in all cases receive much more attention than is usually bestowed upon such affections. The treatment is obviously bleeding from the arm, followed up by occasional cupping on the loins, with the frequent use of the warm or rather vapour bath; and the excitement of the capillary vessels, and secretive organs generally, by calomel and occasional purgatives, such as castor-oil, rhubarb, or senna, and avoiding all those of a saline description.

196. Congestion, however induced, may be succeeded by inflammation of the organ. The secretion of urine in this case will be suppressed, and more pain be experienced; when, in addition to bloodletting, which should be of a more active description, and the vapour-bath, the continued application of a large poultice to the loins after cupping, and subsequently a blister, may be recommended. And the calomel, in combination with opium and emetic tartar, or digitalis, should be continued, after the free relief of the bowels by castor-oil, till gentle salivation is induced; and after this, balsam of copaiba is a useful remedy.

197. The treatment of all the cases of disordered secretion previously alluded to, as I have before noticed, must be based upon one general principle, namely, the restoration of the general health; seeking it, however, more particularly through the blood's purification, and the especial derangement which has given occasion to each particular affection. Thus should gout be treated; the characteristic symptoms of which are, pain of an acute character, situated in some of the joints or other of the ligamentous structures, and more or less of an intermittent spasmodic character, and attacking the great toe or ankle in persons of a plethoric habit more particularly, and developing in such cases inflammation and swelling of the whole foot. In other cases, the knee, the wrist, or the knuckles, will be the seat of the affection; and it will be, moreover, often transitory in its location, shifting from one joint to another, thus evincing that the blood is the seat of the disease, and that the local affection is but its consequence. In this erratic form, the pain often exists without the slightest swelling of the part. In some cases, and generally so in those of the latter description, the disease will exist without fever; in others, especially if the immediate exciting cause of the attack has been the influence of cold, this will exist also.

198. *The Treatment of Gout.*—Such are the symptoms: now, what is the treatment? Evidently the purification of the blood by the excitement of the secretive organs; removing, however, if it be possible, in the first instance, the immediate exciting cause of the attack, whatever that may have been; or its more immediate effect when this is not to be done, as with cold, which I before mentioned is frequently an exciting cause in those who are predisposed to the disease, as it checks the secretion of the skin, congests the vessels of the kidney, and deranges its function, in common with that of the liver.

199. Constitutional predisposition to any particular form of disease, we know, may be hereditarily engendered, as well as otherwise acquired. It will occur to the mind, therefore, as consisting probably in some especial debility of the organization; and in gout to consist in a torpid action, or liability to derangement of the function of the kidneys, or a weak state of the assimilative and depurative organs of some kind. I mention the kidney in particular, as the derangement of its function in gout is one of the most frequent and characteristic symptoms of that complaint. There are other diseases of a hereditary nature, which we may suppose to be connected with a parentally imparted taint of blood.

200. In addition to cold as an exciting cause of the attack in gout, may be mentioned one of perhaps still more frequent occurrence, namely, irritation of the bowels, or derangement of some kind of the digestive organs, induced by eating excess of animal food, fruit of some kind, pickle, or pastry; or drinking beer, acid wine, or wine of any description in some cases. In all cases, therefore, it may be established as a rule, that the treatment of the attack should be preceded by an active but mild purgative in removal of any offending cause from the bowels. And this should be followed up, or rather, (if the part affected be

much swollen, or the subject be plethoric, and pain in the head, or about the regions of the stomach and liver, or oppression of breathing be complained of,) preceded by, bleeding from the arm to the extent of from twelve to twenty ounces; and the same measure may be again carried into practice, after the operation of the purgative, if the above symptoms are not relieved. After the operation of the purgative, and with a view of exciting the secretions in general, and allaying nervous irritability, a compound of calomel, emetic tartar, and opium—in the proportion of half a grain of the first and a quarter of a grain of each of the two others, and repeated every two or three hours—will be the appropriate treatment, till bilious evacuations and perspiration are induced, when the following mixture, which will act upon the bowels and kidneys, may be substituted, and thus will all the secretive organs be acted upon in relief of the system; a drachm of carbonate of soda, three drachms of sulphate of soda, one drachm of wine of colchicum, dissolved in half a pint of water. A fourth part to be taken every four hours, till relief is obtained, when it may be gradually omitted; continuing it, however, two or three times a day, and substituting for the water half a pint of decoction of bark as a tonic. In addition to which, a pill of a grain of calomel with as much aloes, may be taken every other night, for the more perfect purification of the blood, by the excitement of the biliary and urinary secretions, till health is restored. The colchicum is supposed to influence the secretion by the kidney of urea in particular, which, as I before said, is known to abound in the blood in these cases; and hence the use of colchicum in gout. Till biliary stools and relief are obtained, everything in the shape of solid sustenance should be avoided—the diet being confined to sago, panada, well-boiled rice, and the like, with a pretty abundant supply of diluents, as barley or rice-water, rennet-whey, toast-and-water, and so

forth. To the swollen part, if hot, much relief will be obtained by the continued application of rags moistened in tepid water, to a teacupful of which may be added a couple of tablespoonfuls of spirits of wine and liquid acetate of ammonia; covering the rags with a towel, to prevent its too hasty evaporation, as no sense of cold should be induced, though immoderate heat should invariably be reduced.

201. The patient, being now relieved, should carefully avoid any fresh exciting cause of attack, and do his best, by attention to diet, air, exercise, and the like, to establish a more healthy condition of blood and strength of system; avoiding physic as much as possible, and every other debilitating agency—moral causes, as perturbation and anxiety, or too much application of the mind, not being less scrupulously avoided; the latter, indeed, deserve especial attention, as being very frequent causes of attack.

202. *Sciatica, Tic-douloureux, &c.; their more especial causes and treatment.*—Sciatica, tic-douloureux, and other forms of neuralgia, are all varieties of the same affection of the nerves, but differently located. In addition to the amount of causes originating in derangement of the secretive and assimilative organs, I have mentioned irritation at the source of nervous power; meaning thereby, the origin of the nerves especially affected; and consisting, for the most part, in congestion or rather inflammatory irritation of the membranes of the brain or spine about the origin of such nerves; and in other cases no doubt the same condition of the membranous sheath of the nerve especially affected.

203. The treatment of these cases should be first directed to the secretive and digestive organs, taking cognizance of anything that may be wrong in the performance of their functions; and should pain be discovered upon examination of the spine or along the course of the nerve, cupping or

leeching the part should be adopted, and this followed up by hot fomentation of the part, and bleeding again some hours afterwards if necessary; and subsequently a blister should be applied if the pain continue. In chronic cases, should the above means prove unavailing, much benefit may be derived from the carbonate of iron, in doses of a drachm three or more times during the day, or the sulphate of quinine, (the primary cause in such cases being probably malarial influence,) in doses of two grains as frequently taken. In some cases the cold douche directed to the part has been successfully resorted to, and in others the vapour-bath every other day. In sciatica and tic-douloureux a succession of small blisters on the painful part, and the application to the blistered surface of a grain of morphine daily, has, it is said, proved a very successful practice; or an ointment of belladonna instead of the morphine may be substituted. In fine, there are but few cases that may not be successfully treated by the resources of medical science, provided a clear conception of the cause and nature of the disease is entertained, and there exists no positive organic lesion, but which may be developed by long continuance of the disease, and no doubt occasionally is so in cases of tic-douloureux.

204. *The Treatment of Cutaneous Affections.*—Cutaneous affections, excepting some of specific character, are for the most part curable upon the same general principles, namely, the blood's purification and its amendment in quality, conjoined with the use of the vapour or warm bath, the skin's function in these cases being more particularly affected.

205. *General Remarks.*—Having pointed out what are the most prevailing disorders and diseases of the digestive and assimilative organs, and some affections of the nervous system consequent thereon, with the principles for their treatment, it will be obvious from the explanation given of them,

that it is not swallowing a farrago of medicine—but by attention to diet, air, and exercise, with sufficient bodily and mental repose, abstinence from spirituous beverages, and avoidance of cold, that these disorders are not only to be prevented, but cured also in the majority of cases. I have, however, hitherto omitted from consideration the higher grades and more specific diseases of the liver, which will now, therefore, become the subject of our attention.

CHAPTER IX.

OF LIVER DISEASE, AND CERTAIN ASSOCIATED AFFECTIONS OF THE LIVER, STOMACH, AND BOWELS—CONSTITUTING CHOLERA MORBUS AND DYSENTERY.

206. *Congestion of the Liver; its Protective Influence.*—Referring to what I have already said on torpor of the liver, it will be recollected that I pointed out how any debilitating agency, acting upon the heart and powers of the circulation, must tend to produce a congestive accumulation of blood in the liver; and that did not a safety-valve of this description exist, we should be in constant danger of apoplexy or of something as bad. Adverting to this arrangement, I must now add a fact, deserving attention, as not only supporting the correctness of these and some other of the views I have taken, but as manifesting another in addition to the many instances I have pointed out of harmony and design in our organization, which is, that had the congestive accumulation taken place in any other part of the system excepting the liver, inflammation as a consequence of obstruction to the

circulation in the part must have ensued, but which is not the case here, in consequence of the blood circulating in this organ being venous, instead of the more highly endowed arterial circulating in the rest of the organs.

207. Instead, therefore, of the destructive process of inflammation becoming developed by congestion, the comparatively harmless one of torpor of the liver's function becomes a constant occurrence, if serous exudation from the veins of the bowels—inducing diarrhœa or watery purging—does not take place to its relief—which is frequently the case—and thus are we protected from the more serious calamity. Inflammation of the liver and bowels does, however, from this cause, (congestion,) when long continued, occur; but this is not the rule, but rather the exception to the rule, and of which I shall speak hereafter.

208. *The Debility and Disorders of the Liver consequent on Heat of Season.*—The congestion of the liver in all cases will be more or less considerable, in proportion to the amount of cause which gives rise to it; which leads me next to observe that this offers a simple and satisfactory explanation of the frequency of disease of the liver, bowels, and associated organs, in hot climates; and in proportion to the minor degree of the same cause—high atmospheric temperature during the summer season—it explains also the prevalence of the same description of disorders in our own country. Heat, as I have explained when speaking of the climate of India, so rarefies and attenuates the air, and thereby diminishes the amount of oxygen inspired, that the chemical actions of life and the powers of circulation are proportionately diminished: hence the general sense of debility experienced in hot weather, and the derangements of health, and of the liver in particular, which subsequently ensue. Cold also, in its effects in deranging the balance

of circulation, is in this country another and more frequent cause of liver disorder, as we shall hereafter show.*

209. *Symptoms of Torpor and Congestion of the Liver explained.*—Repletion, cold, and mental excitement, in this country, are the more frequent causes of liver congestion and torpor; the ordinary symptoms of which I shall now proceed to explain. Torpor of function must of necessity follow retardation of the blood's circulation through the liver, and with a defective secretion of bile the bowels will be confined, and headache, the usual accompaniment of this, will follow. But why will headache follow? A peculiarity connected with the circulation in the brain, will, I believe, account for

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* *Estimate of the reduction of the Heart's Power and Force of Circulation by the Climate of India.*—The deprivation of strength, or reduction of electro-nervous power, experienced by the European from the air's attenuation in the climate of India, may be estimated at a quarter less than that enjoyed by him in this country. Thus, assuming that the mean annual temperature of the climate of our presidencies in India is eighty degrees, (which is about the truth,) and that of England is fifty degrees, (say, however, that it is sixty degrees in this country, as being equally congenial;) and that man's strength is in the same proportion, or inversely as these two numbers eighty and sixty, or relatively in favour of power in the colder climate as eight is to six, and that the heart's power and the force of circulation is in the same proportion; it follows, if we estimate the quantity of blood to be kept in circulation, or the amount of the blood's resistance to be overcome by the heart's power, as a fifth part of man's weight, or twenty-eight pounds, (the usual estimate, taking his weight at the average of ten stone)—it follows, I say, upon this estimate, that the European upon his arrival in India has an excess of blood over the powers of his system, of one fourth of this amount, or seven pounds! This is, perhaps, but a rough estimate, but it is sufficiently correct to account for the frequency in India of liver congestion and the associated diseases of the stomach and bowels requiring the use of the lancet; and is explanatory also of the prevalence of similar affections in this country during the warmer seasons of the year. The effect of heat in producing congestion of the liver, is very strikingly exemplified by the practice pursued in Italy, of confining geese in heated apartments, and feeding them abundantly, and by these means augmenting the size of the liver of these bipeds to an enormous extent for the indulgence of the epicure.

this; which is, that the brain is protected by an unyielding bony case; consequently the circulation of the blood in the brain is not to be influenced by the pressure of the atmosphere *ab externo,* as in the case of the circulation in the rest of the organs, on the heart's dilatation and the expansion of the chest. Second, therefore, to the liver, on every cause of depreciation of the action of the capillaries and of the heart's force, will venous engorgement or congestive accumulation take place in the brain; as, although less blood would be carried by the arteries, (as no vacuum or unoccupied space could take place in the cavity of the skull,) venous distension must follow. Hence, I believe, the pain, *malaise,* giddiness and lassitude, experienced under such circumstances. And next, from the torpidity of the liver, the blood is but imperfectly purified from its recrementitious and biliary particles; the countenance and skin, consequently, become sallow from their retention; and the mind, from the same cause, becomes irritable and desponding; the nights are sleepless or disturbed by dreams, and a sense of dryness and heat of the palms of the hands or soles of the feet, with a feverish state of restlessness, is often complained of. The stomach participating in the general disorder, its secretion is deranged, and there exists loss of, or a capricious appetite, with thirst. The pulse is now contracted or oppressed; the skin is usually dry, and the tongue in general is furred. A sense of fulness and oppression, and sometimes tenderness of surface, are also experienced about the region of the liver and stomach. Pain, if any, is more frequently complained of as existing between the shoulder-blades. This leads me to observe, that the substance of the liver I believe to be void of sensibility, or nearly so and that the pain felt in the side at a more advanced stage of the affection, is owing to the implication of its investing membrane—the peritoneal covering, and that it is distension or in-

flammation of this highly sensitive membrane alone that gives pain to the part at any time.

210. *Bilious Fever, &c.*—The above symptoms may be preceded by, or accompanied with, a short stage of excitement and increased secretion of bile, as a consequence, probably, of irritation communicated to the biliary ducts by the ingestion into the stomach of some spirituous beverage or other irritant, inducing bilious purging; or, from the combined effect of cold or other deranging and exciting cause, the affection is sometimes attended with a considerable amount of febrile re-action, or associated fever; when it is usually denominated bilious fever.

211. *Debility and the Symptoms of the Chlorotic Female.*—A much milder and less prominent affection than any I have yet noticed may occur, the leading features of which are general debility, accompanied with *malaise*, a sallow countenance, and constipated bowels; and often attended with headache or cough, and sometimes a vicarious expectoration. This, I believe to be the condition in general of the chlorotic female, the interruption of the menstrual relief not being the cause but the effect of the biliary and general derangement. The secretions in these cases are all disordered, and the blood, in consequence, is deteriorated; hence there is a depraved, or if the congestion of the liver be considerable, (preventing the absorption by the veins of the alimentary fluids from the stomach and bowels,) a complete loss of appetite, with coldness of the extremities; and if this continue great emaciation follows.

212. *Effects of Torpor of the Liver upon the Female at a later Period of Life.*—With females at a later period of life, another train of symptoms flowing out of the same affection, (torpor of the liver,) takes place; based, however, in general, upon the congestion of repletion, succeeding to the termination of the menstrual relief; when if fat, which

becomes now often abundantly formed for the relief of the system, does not take place, or is insufficient for this purpose, a vicarious leucorrhœal discharge, or a dropsical state of the abdomen, or disease of the womb, takes place; or apoplexy or palsy ensues.

213. *Inflammation and Induration of the Liver.*—Reverting now to the symptoms previously enumerated, of more frequent occurrence and characteristic of torpor of the liver, they may very properly be defined as the first stage of liver disease, a state preliminary to inflammation of the organ, and which now becomes developed in the following way. The retardation of the blood through the liver, and the distension of its veins, necessarily impedes the blood's ingress into them from the capillary arteries, (the liver being furnished with arterial blood for its structural endowments and nutrition.) Distension of these vessels, and inflammation, in consequence, ultimately ensue. This may be gradual, as it generally is, chronic and insidious—being attended with little pain, for reasons I have before given; progressing slowly, though terminating ultimately in induration or hardening of the organ, or in the formation of matter or abscess. Or the congestion may be more considerable; or, by the exposure of the patient to cold, or from drinking spirituous liquor, or from the condition of the blood, or through the conjoint operation of these or other causes, may acute and active inflammation of the organ be at once developed; involving in this case generally its peritoneal covering, and implicating that also of the midrif, when acute pain in the side is experienced, extending often to the point of the shoulder, and attended with cough, difficulty of respiration, and other symptoms of apparent inflammation of the lungs, also febrile excitement and active pulse.

214. *Abscess and Sequelæ of Inflammation of the Liver.*—If the above symptoms of acute inflammation are not soon

arrested, abscess of the organ ensues, which is evinced by copious nocturnal sweat, succeeding to shivering and a short stage of febrile excitement; a sense of throbbing and weight in the liver now often succeeds to the pain in the side; spasmodic twitches or convulsive startings on going to sleep are occasionally complained of; the pulse loses its firmness, and becomes soft and frequent; a copious deposit takes place in the urine; and the bowels often become lax. Or the case otherwise lapses into one of chronic inflammation of the organ, with protracted functional derangement, and attended often with a dysenteric state of the bowels, or other associated disorder of the stomach and bowels.

215. *Dysentery.*—In a large number of cases, and in hot climates and hot seasons particularly, instead of inflammation succeeding to congestion of the liver, dysentery ensues; or otherwise bilious purging; or, in other cases, both vomiting and purging of bile—or cholera-morbus—takes place. These are all links in the same chain of affection, and are thus brought about. The obstruction to the circulation in the liver resulting from its congestion, necessarily throws back the blood upon, or impedes its current from, the stomach and bowels—and distension of the veins of these organs ensues;—occasioning first increased mucous secretion from the vessels of the bowels, in relief of their distension, and subsequently bloody exudation; from which cause and the accompanying distension of vessels, the bowels are irritated and excited to frequent evacuation; and hence, as long as the symptoms are unaccompanied with those of inflammation and febrile reaction, a muculent purging, or, if blood be also exuded, passive dysentery.

216. These bloody muculent evacuations, the early condition of dysentery, may last a day or two, or a much longer period, commensurate with the extent of the congestion, and the relief thereof afforded by the evacuations. Or, the

acute and active disease, accompanied with inflammation of the large intestines (the seat of the disease) may at once take place, from the combined influence of cold or other cause of arterial excitement; the congestion of the veins of the bowels in this case, as in that of the liver previously noticed, occasioning arterial turgescence of the bowels, and its consequence, excitement—or inflammation. Hence the pain complained of below the navel, which succeeds the scanty evacuations of blood and mucus, with the constant efforts at expulsion, the severe straining and pain at the anus, the dry or clammy skin, the loaded, white, excited tongue, and febrile pulse; and attended, if the stomach is implicated in the affection, with sickness of stomach; and in the more advanced state of the disease, if the bladder or kidneys become involved in the affection, with scalding and difficulty in voiding, or suppression of urine.

217. *Sequelæ or Termination of Dysentery.*—The above symptoms of inflammation of the large intestines, if not promptly and vigorously treated, often run a rapid course and terminate in mortification, which is evinced by the sudden cessation of pain, prostration of strength, delirium, cold clammy sweats, more fluid, copious and offensive evacuations, hiccupping, vomiting, and occasionally of coffee-ground-looking matter, cadaverous countenance, and feeble pulse. Or, the inflammation, as in the case of the liver, may be retarded and the symptoms mitigated, but not cured: the case becoming one of chronic dysentery. In which case, ulceration of the mucous membrane of the bowels takes place, attended with porridge-like muculent evacuations, straining, and protracted constitutional disturbance.

218. *Bilious Purging and Cholera Morbus.*—Instead of dysentery and inflammation of the large intestines becoming developed, as just noticed, the distension of the blood-vessels

is sometimes more particularly felt in the stomach and small intestines; whereby inflammation becomes developed in the upper or duodenal portion of the latter: hence irritation and excitement are imparted to and extend up the biliary ducts opening into the bowels, occasioning increased biliary secretion, and its result, bilious purging. The same affection in a higher degree, and implicating the stomach more largely, is attended with bilious vomiting; and hence both vomiting and purging of bile—or cholera-morbus—ensues.

219. The bilious vomiting and purging of the intemperate I believe to be induced in this way—that is, by irritation imparted to the duodenum, and extending up the biliary ducts. And furthermore, it may be inferred that the suppression of perspiration by cold, and repression of blood from the surface to the internal organs, would often prove an exciting cause of similar attacks in persons predisposed by intemperate habits, and occasion the same in others having congestion of these organs, and aggravate the disorder in either case; which experience proves to be the fact.

220. *Modification and Variety of Disease.*—In conclusion, it is abundantly obvious that these diseases are, as I have represented them, all one unbroken chain of effects, arising out of one general cause, and implicating the stomach, bowels, and liver, though in various degrees; and that the symptoms of each may accordingly manifest themselves in single groups, or be otherwise variously combined, as well as modified by the habits of the individual, the season of the year, or other deranging and influencing cause: and hence their number and variety.

221. *Malaria another Debilitating Cause, giving rise to Dysentery and Liver Affection.*—In addition to the foregoing causes of dysentery and liver affections, it must, how-

ever, be added, that in certain seasons, as well as in certain localities, these diseases are often based upon or connected with a febrile cause—the debilitating and poisonous influence of malaria upon the system. Hence, in localities favourable to the production of malaria, or in seasons in which the intermittent and typhoidal types of fever are prevalent, this fact must be carefully borne in mind, as the chief point of practice in the treatment of these affections of the bowels and liver, developed under these circumstances, is based upon its observance. From the want of this being more generally known and acted upon, I feel no hesitation in saying, many—aye, very many—both in India and in this country also, annually lose their life; the fever in these cases being in general so modified and obscured by the more prominent symptoms of the local affection, as neither to be seen nor even supposed to exist. But on this subject I shall treat more particularly hereafter.

222. *Treatment of Torpor and Congestion of the Liver.*—The primary link in the chain of diseases of the liver, I think I have pretty clearly established to consist in congestion of that organ and torpor of function, dependent upon the circulating powers not being equal to maintain the blood in free circulation. Bleeding in relief of oppression, and calomel for the excitement of the liver and the powers of the circulation, are therefore our chief remedies. Accordingly, the former, in relief of the congestion, should be immediately practised to the extent of from twelve to twenty ounces, and repeated, if necessary, at intervals of two or three days, or oftener, till the breathing is perfectly free, and every feeling of oppression about the organ is perfectly removed. At the same time, a pill of two grains of calomel and one grain of aloes, should be taken every night, or oftener; and two drachms of Epsom, Glauber, or Cheltenham salts, every second morning, till the secretions of the bowels are

perfectly healthy, and sleep and appetite restored;—when, to prevent a reeurrenee of the disease, a more abstemious diet should be observed, and as much exercise taken as the patient is eapable of, short of producing fatigue; and the eold bath and other applianees should be resorted to in order to strengthen the system, and give vigour to the circulation.

223. *Treatment of Bilious Fever.*—The simple and more eommon affection is here to be understood, in contradistinetion to the remitting type of fever with bilious symptoms. The fever in this ease is of the simple inflammatory kind—the same as oecurs from eold, but associated with liver congestion and derangement; and is attended often with a good deal of eerebral excitement, and sickness of stomach, or bilious vomiting, as well. Bleeding in this ease should be immediately praetised proportionately to the exeitement and eonstitution of the individual: from sixteen to thirty ounees may often be taken with advantage and repeated after the operation of an active dose of ealomel and jalap—three grains of the first with thirty of the last—should pain in the head, oppression of breathing, or tenderness about the liver or stomach, continue. The bowels in these eases are sometimes obstinately costive, which we may suppose attributable to eongestion of the brain, seeing that it very generally gives way to the application of a dozen leeehes to the temples. A large clyster is at the same time often a useful and very proper expedient. The bowels having been effectively relieved, the purging should be followed up by small doses of ealomel, in combination with emetic tartar and a minute dose of opium, every two or three hours, till bilious evacuations are freely obtained, and the skin becomes perspirable—say twelve grains of calomel, three grains of emetic tartar, and two grains of opium, made into twelve pills. If the stomach,

after it has been once sick, will not tolerate this quantity of emetic tartar, let the dose be reduced to two thirds or half the amount. After the skin becomes perspirable, the case is reduced to one of simple congestion, and requires only a continuation of the pills at longer intervals—two or three times a-day—till the secretions are healthy; or a pill of calomel and aloes every night, with attention to diet, air, exercise, &c.

224. *Additional Remarks.*—Upon the subject of torpor or obstruction of the liver, I will add a few observations in reference to debility and the chlorotic state of females. I have been consulted of late in two cases of great emaciation, torpid bowels, loss of appetite, and coldness of the extremities; in one case, pain of the stomach, and sickness after meals, and in the other menstrual obstruction, and hysterical symptoms; no pain in the side was complained of, but head-ache and despondency existed. These were cases in which small bleedings, conjoined with moderate doses of calomel and aloes, and the use of the warm bath, with air and exercise, would have restored the patients to health: but as the pulse and emaciation, in the estimation of the friends, were opposed to my views, other advice was acted upon. One of these patients I know to have died: the other, who was taken to the Continent for change, fell into the hands of a physician, who thought he had discovered some spinal affection, (and it is very probable that, from debility, some curvature may have existed,) and who having, in consequence, applied some leeches to the part, I heard and could believe, had done the patient some good. The emaciation in these cases was, to my apprehension, the simple and necessary result of the obstruction in the liver intercepting the absorbing process of the veins of the stomach and bowels; and the sense of cold and debility was the necessary consequence of this—the want, in short, of fresh nutritive

matter to maintain the combustion and active condition of the circulating system ;—affording indications of treatment quite opposed to tonics, which were the remedies employed in these cases, and are those so generally resorted to under similar circumstances.

225. *Treatment of Bilious Purging.*—Should bilious purging, from increased secretion and irritation of the bowels, succeed to congestion of the liver—as is sometimes the case—(from, we may suppose, irritation communicated to the biliary ducts, as a consequence of congestion, or from imparted irritation of the duodenum, through the ingestion into the stomach of some irritating substance or spirituous beverage,) congestion of the liver being the basis of the affection, blood-letting is primarily indicated to the extent of from twelve to twenty-four ounces, or the quantity justified by its effects upon the pulse at the time of the operation and the circumstances of the case ; following this up by two grains of calomel, in combination with half a grain of opium, every three or four hours, till the purging ceases, or the evacuations, which are in general green and muculent, become healthy ;—repeating the bleeding, or leeching the part, or not, as circumstances may indicate ; and following up the calomel, a suitable time afterwards, with a dose of castor-oil.

226. *Melæna.*—After long-continued congestion of the liver, in certain conditions of the blood and general debility, instead of bile being secreted, the patient will sometimes evacuate a quantity of black sooty pulverulent coffeeground-looking stuff. This I believe to consist of the colouring-matter of the blood, the latter, by long retention in the liver, having lost its vital attributes ; the discharged matter being, indeed, an exudation from the blood-vessels rather than a secretion of the organ. We must look upon this, therefore, in general, as a bad symptom, evincing extreme

oppression and defalcation of the secretive power of the liver. Black, tarry-looking, and spinach-like stools, are seeretions which have been long pent up in the liver, or in the gall-bladder, and may therefore, on the eontrary, be hailed, in a general way, as evincing that the ease is progressing towards amendment, and that calomel and purgatives are further indicated;—in short, in getting rid of such matter, it will in general be found we are dislodging the enemy, and with it the principal cause of the diseasc; whereas the former attends, perhaps, scirrhosis, and will be followed by dropsy.

227. *Treatment of Cholera Morbus.*—The quantity of green bilious fluid ejected by the stomach, and evaeuated by the bowels, in a ease of this kind, is sometimes very great; and the irritation and exhaustion eonsequent thereon are often extreme. The true character of the disease must, therefore, be steadily held in view, as one highly congestive of the liver, and not unfrequently associated with, or succeeded by, inflammation of that organ. Bleeding is, therefore, obviously indicated; but, when the exhaustion is considerable, this must necessarily be cautiously practised, the patient being at the time in the recumbent posture, and the quantity of blood taken limited by its effects upon the pulse—withdrawing it from a small orifice—and repeating the bleeding afterwards every three or four hours, as excitement becomes developed, or as circumstances render neccssary. The bilious evacuations—which I believe to be a eurative effort of the system, in most cases, for the relief of the oppressed organ—however proper it may be to moderate them, should not, therefore, be hastily suppressed. The operation of calomel being modified by the extent of the dose, a large one is here indicated: twenty grains may often be given with advantage, eombining it with a grain of opium; and a fourth or sixth part of this quantity, with half a grain of opium, repeated every three or four hours

afterwards. A large mustard plaster should at the same time be laid over the whole region of the stomach and liver, and be kept there for fifteen or twenty minutes. And upon the principle of derivation, advantage will be afforded by immersion of the feet and legs in a pail of hot water, in which a couple of ounces or more of flour of mustard have been diffused; or, in severe cases, immersion of the whole body in a bath of the same description may be very advantageously practised. The vomiting, if considerable, is best allayed by the occasional administration of a large clyster of thin gruel, in which a teaspoonful of salt has been dissolved; or, half a drachm of calcined magnesia in a small wineglassful of water may be given between the doses of the pills, with the same intention.

228. The vomiting and more urgent symptoms being by these means allayed, the liver should now be more particularly examined; and should there be pain or tenderness experienced on pressure, a dozen or twenty leeches should be applied, and when they have done bleeding, a large blister should succeed them;—the pills being continued every four or six hours, till gentle salivation is induced.

229. The symptoms of cholera induced by the ingestion of some poisonous agent or irritant into the stomach—as stale oysters or other improper article of diet or beverage—and of which bilious vomiting is a curative effort of the system, require but the aid of a few doses of calomel and opium, and the support of light nutritive broths, and occasionally a cordial: a mustard plaster over the stomach also is a useful auxiliary.

230. *Treatment of Inflammation of the Liver.*—The development of this in the acute form is evinced by pain in the right side, under the margin of the ribs, and extending often with the liver considerably across to the left side, and, by nervous connexion, to the point or blade of the shoulder:

this is attended in general by eough, oppressed breathing, hot skin, and excited pulse. I must here, however, observe, that with active disease in the liver, the heart is often but little implieated, the pulse seldom exeeeding ninety-six, and the skin but little inereased in temperature ; exeepting in those eases in whieh the peritoneum and diaphragm are implieated in a greater degree—when the cough and difficulty of respiration are so mueh the more prominent symptoms, that the ease often simulates one of inflammation of the lungs.

231. *Acute Inflammation of the Liver.*—The treatment adapted to the emergeney of the ease, (evineed by the pain, eough, and oppression of breathing,) must be prompt and deeisive. The patient should be immediately bled to fainting, from a large orifiee, and this should be followed up with an active dose of ealomel and jalap—three grains of the one, and thirty of the other ; and every two hours afterwards by a solution of one of the saline purgatives with emetie tartar—a draehm of Glauber or Epsom salts with a quarter of a grain of emetie tartar, dissolved in a large wineglassful of water. After the effeetive operation of the purgatives, unless the oppression of breathing and other symptoms are materially mitigated, the bleeding should again be praetised. Otherwise, the patient should be immersed in a warm bath for half an hour, and afterwards twenty leeehes should be applied to the side, and after their removal, (without staunehing the blood if the patient is not very mueh exhausted,) a large warm poultiee should be applied ; the stomaeh at the same time being kept nauseated with the emetie saline mixture. The more aetive eondition of inflammation being by these means subdued —the skin beeoming moist and the pulse soft—a large blister should be applied over the affeeted organ, and should be kept open. We may now have reeourse to ealomel in doses

of two grains in combination with a quarter of a grain of emetie tartar and the same quantity of opium, every three or four hours, till gentle salivation is induced, observing, at the same time, to leech the anus or bleed from the arm should the stimulus of the mercury prove too exciting.

232. *Chronic Inflammation of the Liver.*—This, or a less active condition of inflammation, may succeed to the mitigation of the acute disease; or succeeds directly to congestion of the organ, and not unfrequently occurs as a sequel of fever. Pain or oppression in the side is complained of, with feverish and restless nights; and pain of the rheumatic kind in the shoulder, and occasionally elsewhere, may be also present. There are also continued torpor and derangement of the bowels—a dysenteric state being in some cases complained of; loss of appetite; headache, and contracted pupils: occasionally sickness and oppression of stomach, and pain after meals, are attendant symptoms, as well as an oppressed or contracted, and slightly increased frequency of pulse, dry skin, furred tongue, and sallow countenance. These, wholly or in part, are the principal symptoms. The treatment consists in bleeding to the extent of from twelve to twenty ounces, and the administration of a pill of two grains of calomel, with a quarter or a third of a grain of emetic tartar, two or three times a-day, and a saline purgative, as two drachms of Epsom salts, every morning. And if it can be conveniently done, the patient should be immersed in a warm bath for half an hour or longer every evening. The bleeding should be repeated in a day or two, and this be followed up by the application of a dozen leeches to the anus, and as often after as necessary—that is, till pain and oppression are completely removed. A blister should also be applied to the side, and after the surface has healed, should be occasionally repeated; or a seton should be inserted in the side, and kept open.

On the gums becoming tender, the pills should be repeated less frequently, but should nevertheless be continued till gentle salivation is induced, and the gums kept tender by the same means afterwards for some time, till the healthy function of the organ is pretty well established. After the blister has healed, if the seton be objected to, half a drachm of mercurial ointment, or more, may be daily rubbed in upon the side for half an hour or longer, and a purgative of jalap or senna administered every second day, instead of the calomel being taken,—and salivation or tenderness of the gums be induced in this way.

233. *Dysentery.*—The characteristic symptoms of dysentery are a sanguineo-muculent flux from the bowels, frequent desire and attempts at evacuation, and severe straining, with pain about the navel, and also very generally at the anus;—effects resulting from the blood's stagnation in, or impeded current from, the veins of the bowels, in its passage through the liver, by which increased mucous secretion and sanguineous exudation into the bowels take place; and from the congestion of the liver which occasions it, it is not unfrequently associated with inflammation in that organ; or otherwise inflammation certainly exists in the bowels. The treatment is, accordingly, bloodletting in relief of the congestion of the liver and distended veins of the bowels, and the attendant inflammation; in conjunction with mercury, to excite biliary secretion and increase the circulation through the liver. With these intentions, from twenty to thirty ounces of blood should be immediately taken from the arm, and twelve grains of calomel be administered, following this up two hours after with an ounce of castor-oil. After the operation of the oil, the bleeding should be again practised, or twenty leeches applied to the abdomen, and repeated every six or eight hours afterwards in quantity

proportionate to the necessity of the case—with reference less to the pulse than to the straining complained of, the scantiness of the evacuations, their frequency, and the blood they may contain, as well as pain at the anus, or pain on pressure beneath the navel or along the course of the colon, or situation of the cæcum; administering, at the same time, three or four grains of calomel with one grain of ipecacuanha in pill, and a third of a grain of opium every three or four hours, till a bilious stool is obtained—which, marking the liver's return to duty, and the obstruction being removed, or partially so, is attended with marked relief to the patient; and as the influence of the mercury becomes more apparent on the system, so is the amendment progressive. When the gums become tender, or rather when salivation is induced—which in these cases is the object to be held in view—the pulse in general becomes full and energetic; the surface healthily excited; the spirits buoyant; and straining and evacuation, and every other distressing symptom, vanish.

234. Should the patient not have come under treatment sufficiently early to justify the active bleeding we have advised, or in a less severe form of the disease, twenty leeches should be applied to the abdomen, and repeated as often as necessary; and after their removal, the patient should be immersed in a warm bath for twenty minutes or longer; or if this be not available, the abdomen should be covered with a warm poultice, or a cloth wrung out in hot water like a bandage may be wound round the body two or three times, and this well protected from cold by a bandage of flannel wound round it; one or the other being applied and renewed occasionally; and the pills being at the same time given according to the exigencies of the case. Warm emollient oily clysters may be also administered occasionally where they afford relief. The diet in all these cases should be

confined to sago, arrowroot, or barley-water, with milk, and limited to a few spoonfuls at a time, though it may be frequently given if desired.

235. Should the inflammation have been of the active kind, and not be subdued during the first three or four days of the disease, mortification of the bowels will probably ensue, which is evinced by the sudden cessation of pain and straining, fluid offensive watery evacuations, hiccupping, delirious wandering, and general prostration. When this takes place, the object is to support the declining powers of the system by wine and nutriment, to soothe the patient by opium, and palliate symptoms as they arise.

236. *Chronic Dysentery.*—Instead of mortification ensuing, the acute stage of the affection (being mitigated but not arrested) lapses into the chronic form of the disease; the patient having six, eight, or more, muculent and more or less feculent evacuations, tinged with blood, and attended with straining, in the twenty-four hours. The evacuations are often yeasty and of porridge-like appearance, and more frequent during the night than in the day. The treatment of these cases, in which the mucous membrane of the large intestines is in general ulcerated, must be of a modified character. The irritation of much mercury upon the system is to be avoided, though attention should be paid to the secretion of the liver. Blistering the abdomen is often of great benefit, as well as the occasional application of a few leeches to the anus, in relief of the straining. The balsam of copaiba, in doses of half a drachm three or four times a day, is also another useful remedy, conjoined with an opiate at night. In other cases, a grain of the sulphate of quinine in pill, three or four times a day, and an opiate at night, will succeed better. Immersion in a warm bath for half an hour or longer daily, is a useful expedient; and flannel clothing desirable.

237. A chronic dysenteric state of the bowels is a frequent attendant upon an indurated state of the liver, or abscess in that organ, and symptomatic also of chronic inflammation of the organ.

238. *Dysentery with Remittent Fever.*—I must now draw attention to the very important fact already noticed, that in localities favourable to the production of malaria, dysentery and gastro-enteritis are often based upon or connected with fever of the intermittent or typhoidal type; the fever in such cases being often so masked and obscured by the more prominent symptoms of the local dysenteric or gastric affection, as wholly to escape observation; but when the attendant is fully awake to the probability of such an occurrence, attention will discover periods of remission and exacerbation in the symptoms—either in the attending fever, as marked by the frequency of the pulse and the temperature and condition of the skin, or in the bowel affection—exhibited by pain and frequency of evacuation, or vomiting and stomach affection.

239. In all cases where the amendment is not equal to the measures which have been pursued, and especially so in the season or place in which intermittent and typhoidal fever prevails, there will be strong grounds for suspecting its existence. Should this be detected, the treatment must immediately assume a very different character, the disease being one intrinsically of fever, exciting inflammation, and developing the dysenteric or stomach affection, in one in whom there pre-existed congestion of the liver and bowels, or predisposition to the disease. In such case, the primary indication of treatment consists in superseding the influence of malaria on the system, or the febrile cause giving rise to the affection, by the administration of the sulphate of quinine, in doses of a grain or two every two hours, after a few doses of calomel have been taken, conjointly with bleeding once or twice in relief of the local affection, if these

means have not been previously adopted. The quinine must be followed up, after the fever has been arrested, by calomel in moderate doses, with the occasional application of leeches to the anus, in relief of the pain, or straining, or sickness of stomach, till the gums become tender, and the secretions of the bowels are healthy.

240. *Inflammation of the Peritoneum.*—The peritoneum, or membrane enfolding the organs within, and lining the abdominal cavity, sometimes, from exposure to cold or other cause, becomes inflamed; in which case there is acute pain, with heat and tension pretty generally diffused over the whole extent of the belly; the patient in general preferring to lie upon the back, and not unfrequently to draw up his knees, so as to relax the muscles of the abdomen and membrane within. The inflammation may extend and implicate the organs invested in this membrane, and thus the stomach may become inflamed by implication, and vomiting be induced, and in like manner may the bowels be affected, and constipation occur. And contrariwise, the organs may be severally and primarily influenced, and secondarily affect their outer and investing covering, and thence may the inflammation be extended to other portions of the membrane.

241. *Treatment of Inflamed Peritoneum.*—The treatment must necessarily bear reference to the cause of the disease, whether it be primary in character, or secondarily induced. In the first instance, bleeding must be practised commensuratcly in amount to the extent of the inflammation. If the pain is considerable, the tongue white, with red edges, and the pulse frequent, tense, and wiry, the patient should be bled to faintness; and after the bowels have been freely relieved by a mixture of salts and senna-tea, which should be given every two hours for the purpose, twenty or more leeches should be applied to the abdomen; or, indeed, if the pulse continues to justify it, the bleeding

to faintness—taking the blood from a large orifice—should be again first practised, and its effects followed up by the leeching. After the leeches have been removed, and without stanching the bleeding, the abdomen should be wholly covered with napkins wrung out in tepid water, which should be renewed occasionally so as to maintain a comfortable feeling of temperature to the patient. The pills which I have previously advised in other varieties of inflammation, of calomel, emetic tartar, and opium, should be administered, one every two or three hours—made in the proportion of twenty grains of the first, with three grains of each of the other articles, in twelve pills—so as to keep the stomach slightly nauseated, and continued commensurately with the severity of the disease, till the gums become tender, or gentle salivation is induced; keeping the bowels free, at the same time, by castor-oil, a weak solution of Epsom salts, or emollient clysters—repeating the leeches also, or bleeding from the arm, as circumstances may require, and substituting a large blister for the wet napkins, if necessary, at a more advanced stage of the affection, when the heat of surface has been removed. Peritoneal inflammation may be based upon uterine inflammation, and associated with typhoidal fever, in which form it sometimes attacks women after childbirth, and the inmates more frequently of lying-in hospitals. The disease will be modified by this circumstance, and will be noticed when treating on typhoidal fever.

242. *Dropsy of the Abdomen.*—This, I am of opinion, is in all cases dependent upon, or connected with, inflammation of the peritoneum, succeeding to the affection just noticed of primary or idiopathic inflammation in a chronic form, or more frequently to inflammation of one or more of the organs, as the liver, spleen, bowels, or kidneys—the liver more particularly—and extending from within the organ to its outer or peritoneal covering, and thence implicating

other portions of that membrane. In general it is not, therefore, a primary but a secondary affection, of disease of these organs, and as such it must be considered, and treated accordingly. The infiltration of water (the serum of the blood) into the cavity here, marks the sequel of inflammation of theperitoneum—that is, the exudation of relaxation—rather than inflammation itself, though it doubtless may occur from simple congestion. This condition may exist, and often does exist, in one portion of the membrane, and the active disease in another; requiring, therefore, a modified treatment. The indications of treatment obviously bear reference to the cause; the removal of inflammation or disease of the organ especially affected, or that of the membrane which has resulted therefrom, being the object to be attained. With this intention, then, bleeding, whenever the pulse will at all admit of it, is a remedy of first-rate importance, not only with the view of subduing inflammation, but with the further object of aiding in the absorption of the effused fluid, Majendie's experiments, it will be remembered, having established the fact, that absorption takes place throughout the system in the inverse proportion to the distension of the blood-vessels; and this is the reason why increasing the urinary secretion tends so much to reduce dropsical infiltration, wherever located. With these intentions, small bleedings should be frequently practised, and the liver and kidneys be excited to increased duty, by a combination of calomel with diuretics. By these means, the bowels and kidneys being kept in active operation, freedom of breathing will be preserved, which otherwise soon becomes oppressed, and the head in consequence affected, the distension of the abdomen not allowing the descent of the diaphragm and expansion of the lungs. And of all diuretics digitalis is unquestionably the most useful, combining it with the calomel in a pill with a little aloes and

squills, in the following proportions:—Calomel, squill in powder, and aloes, of each eight grains; digitalis powder four grains, made by the addition of a little soap, into twelve pills; one to be taken every six hours. Should these not fulfil all the purposes desired, a third part of the following mixture may be taken conjointly between the doses of the pills. Infusion of seneka six ounces, liquor of acetate of ammonia two ounces, nitrous æther two drachms —mix. On some occasions, to this mixture may be added forty drops of tincture of cantharides; or instead of the pills first named, forty drops of the tincture of digitalis may be added to the mixture, and the bowels be kept open by taking at night a pill of two grains of calomel with as much of aloes. When the powers of the system are not too much exhausted, in furtherance of the relief of the system, and removal of the inflammation of the organ which gave rise to the dropsical affection, and which should not be lost sight of, the vapour-bath may be very advantageously conjoined, and a blister applied over the part affected. The powers of the heart and the system may sometimes require the support of a little wine, and such nourishment as may be most agreeable to the patient; the abdomen being at the same time bandaged—the compression of the organs within favouring the return of the blood to the heart, and aiding in the absorption of the fluid. And a tonic may subsequently be required, as the decoction of bark with one of the mineral acids.

CHAPTER X.

ON THE DISORDERS AND DISEASES OF THE RESPIRATORY ORGANS AND CIRCULATING SYSTEM; OR AFFECTIONS OF THE LUNGS, SKIN, WIND-PIPE, AND AIR-PASSAGES—INDUCING COUGHS, COLDS, RHEUMATISM, CONSUMPTION, ASTHMA, AND FEVER.

243. *Skin and Lungs united in Disease.*—The function of respiration, I have before said, is not confined to the lungs, but is participated in by the skin also; and as these organs are associated in function, so are they similarly subjected to the same causes of derangement; at least, so far as exposure to alternations of temperature, and other vicissitudes of the surrounding air, are concerned in influencing them. Accordingly, the skin, as far as this is associated in disorder with the lungs, and deranged in function by the same causes, will be the subject of our attention in this chapter.

244. It would appear (exposed as the lungs and skin are at all times to atmospheric influence, and seeing the perpetual mutations and numerous perturbating agencies to which the atmosphere in our extremely variable climate is subject) that the respiratory organs must be constantly liable to disease. But the function of respiration being so pre-eminently important to the system, Nature, with her usual conservative providence, has so endowed the lungs as, to a considerable degree, to protect their function from the influence of these deranging causes, as I shall now briefly point out.

245. *Protection of the Lungs.*—The capillary vessels of the lungs, in which the conversion of the venous into arterial blood (the sum and substance of the respiratory

function) is effected, are, in the first place, not the highly endowed susceptible vessels which have the offices of nutrition, secretion, &c., to perform, like the organic capillaries, or those of the general system; the office of the capillary vessels of the lungs, on the contrary, is quite of a passive character, the simple physical qualification of their existence being, by their minute subdivisions, to expose every atom of the blood circulating through them, to the influence of the air, by which, in the air-cells, they are surrounded. Thus the blood, propelled by the heart's contraction, and distributed through these vessels, exhales therefrom, or parts with, the carbonic acid gas it contained; and on the heart's dilatation drawing back the blood from the lungs, to the other side of the heart, for general circulation, imbibes a portion of the air to which it has been exposed; it being, at the same time, deserving of notice, that for the further security of these vessels—that is, in order that their temperature should not be liable at any time to any very sudden reduction—the exchange of air upon each act of respiration is equal to no more than a fifth part of the quantity contained in the lungs under the ordinary circumstances of respiration; and moreover, the inspiratory movements being in the proportion of but one to four of the heart's action, there is a constant influx of warm blood at all times to maintain the temperature of these vessels. These are all very important provisions against derangement of the lungs' functions, which, it will be observed, are effected in these vessels; and afford security against any sudden reduction of temperature to which we may be exposed. By the exchange of but a portion of the air, moreover, we are preserved from the possibility of being poisoned, to which we should have otherwise been liable by a single inspiration of the more noxious gases, and against which the sense of smell, intended for

our protection, would have afforded us no security. The feeling of cold also, experienced by the skin, is another provision, intended for the protection, not only of the skin, but also of the lungs. We should, therefore, always attend to Nature's admonitions, and avoid cold, and especially draughts of air, using exercise to counteract its influence when unavoidably so circumstanced, and retiring to a warmer situation as early as may be afterwards, taking care at the same time to avoid any very great or sudden transition. Nature, for the protection of the lungs against cold, has also interposed another expedient—that of the air's admission into the cells of the lungs being through the protracted route of the warm nasal passages, the throat, and air-tubes, and thus tempering it on its passage. In short, we see her hand interposed in so many ways for our protection and guidance, that we are constrained to exclaim with the Psalmist, "O God! how great and wonderful are thy works, in wisdom hast thou made them all!"

246. *Effects of Cold upon the Lungs and Air-passages.*—In despite, however, of these numerous provisions for our protection, we too often, from presumption or neglect of Nature's admonition, subject ourselves to disorder and disease from cold, which thus gives rise to catarrh (the affection of the nasal passages usually called cold in the head), sore-throat, cough, and the severer forms of affection—inflammation of the wind-pipe, bronchi, or air-tubes; or of the lungs in their entire substance; or of the pleura, or membrane investing or enfolding the lungs, and lining the cavity of the chest. These several affections of the lungs, their membranes, air-tubes, and passages, being all dependent on one and the same cause, are necessarily allied in character, and may exist either singly or conjointly, according to the severity of the cause, the particular circumstances of exposure, the condition of the blood, the susceptibility of

the parts, and the constitution of the individual attacked. The effect of cold, (commensurate with the amount and the above-named circumstances,) in giving rise to catarrh, sore-throat, or cough, acts in the same way, but in a less degree, or to a less extent, than when it induces the severer affections of inflammation of the lungs, air-tubes, &c. ;—congestion or irritation being thus induced, and occasioning those complaints in contradistinction to the severer affection or inflammation of these parts ;—the *quo modo* of which I shall now explain, and exemplify by describing the effects of cold on the nasal passages. The continuation of the skin of the face into the nostrils, becomes, as it does in all other cases of like import, denuded of its outer covering, a mucous membrane ; having to secrete a mucous fluid for the maintenance of a moist surface, essential to the higher endowments of its nature and relative position. The effect of cold, then, in a limited degree, upon the membrane lining the nasal passages, is to act indirectly as an irritant, and thereby to excite and increase its mucous secretion, in the same way that a pinch of snuff directly acts upon the same surface. Thus we find, that going out into the cold air is attended with a watery flux from the nostrils, the quantity secreted in health being only sufficient to maintain a moist condition of its surface.

247. The eyes also often run on the same occasions, from the same cause—the eyelids being in like manner lined with a mucous membrane—and the small gland situated in the upper lid and near the inner angle, destined to secrete a watery fluid (tears) for the maintenance of a moist surface and to wash the globe of the eye, being excited to increased secretion. In like manner the eye waters, or is excited to increased secretion, by any foreign irritant, as a particle of dust which the wind or accident may have introduced beneath the eyelids, and which the increased secre-

tion is intended to wash out—furnishing another instance of the manifestation of the *vis conservatrix naturæ,* which we find at hand upon all occasions for our protection. Similarly, snuff introduced into the nostrils excites increased secretion of the mucous membrane to wash it off, and sneezing for its rejection.

248. *Inflammation developed by Cold.*—Reverting to the operation of cold on the nasal passages, a greater degree of cold than we have already alluded to paralyses the vital endowments of the part, the temperature not being sufficient to support the chemical action which should be maintained in the blood circulating in the capillary vessels. The secretive function of the membrane becomes accordingly arrested, and the blood being at the same time impeded in its passage, (capillary action being essential to its progression,) congestion of these vessels takes place, and exudation follows, or the more watery parts of the blood transude from these vessels to their relief; and hence the copious watery discharge which takes place from the nostrils under these circumstances, and which continues as long as the individual is so exposed; but immediately he comes into a warmer atmosphere, chemical action is again excited in the blood of the part, and the arterial trunks of the capillaries, from distension and increased susceptibility to impression, are now excited into increased action; and hence the heat of the part and the condition of irritation which follows. If the cause has been of long duration, and the excitement is considerable, inflammation, with dryness of the part, succeeds; the hurried circulation of the blood through the vessels, together with the derangement of their function, not admitting of the usual changes connected with secretion being effected. As the inflammatory condition subsides, that of irritation and increased secretion follows,—copious and watery in the first instance, and gradually becoming

less abundant and more natural as health in the part progresses.

249. *Inflammation of the Eye.*—The same effects, somewhat modified in character by the function of the part, constitute inflammation, wherever it may exist; and this admits of ready exemplification in the case of the eye. Cold or other irritant first excites a slightly bloodshot state of the covering membrane of the eye, and increased secretion. This is followed, if the cause is aggravated, by a more bloody-looking and congested state of the vessels (vessels which at other times, from their extreme minuteness, are perfectly invisible,)—and this is followed by increased sensibility, heat, and dryness of the organ, or of inflammation.*

250. *Cough, Cold, Sore-throat, Pleurisy and Inflammation of the Lungs, all Modifications of the same Disease.*—The same effects follow, though in general more moderate in degree, from the parts being less exposed to the influence of cold, and again more warmly endowed by approximation with other parts,—an extension of the affection of the nasal passages to the mucous membrane of the throat, wind-pipe, and air-tubes occasioning sore-throat or cough; or, if in a more aggravated degree, inflammation of the throat or of the wind-pipe, bronchi, or lungs; or of their investing membrane the pleura, and then called pleurisy. The latter, however, we may suppose to be more frequently associated with the effects of cold upon the skin, or its more direct

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* Mr. Travers, in his recent work on the "Physiology of Inflammation," makes the following observation:—"The first effect of a drop of a stimulant fluid, or a wound or other irritant, upon the transparent web of a frog's foot, is seen, under the microscope, to arrest the circulation in the part,—the vessels are dilated, and in proportion their fulness is increased, and their colour heightened; but surrounding the stagnant centre, increased activity of the circulation prevails."

influence upon parts subjacent thereto, and thus acting upon the pleura, or membrane lining the chest.

251. *The Principles of Treatment the same in all cases, but commensurate with the extent of Disease.*—With this explanation of the diseases of the lungs, their membranes and air-passages, it is obvious that the indications of treatment are alike in all cases, though commensurate in kind as well as in degree with the character and extent of the disordered condition; the root of the whole being a condition of inflammation, more or less in amount, giving rise to these various affections, active in kind, or passive in degree. The cause, it is obvious, must in most cases more or less involve the skin, and especially so when inflammation of the lungs or of the pleura is developed, thus occasioning the disorder of its function as a secretive and respiratory organ; with its usual manifestations, namely, heat of skin and accelerated pulse, or fever, of which I shall now offer an explanation.

252. *Of Fever: an Explanation of its Development and Symptoms.*—The primary motions of life and the blood's circulation, it will be remembered, is capillary action, excited by the caloric and electricity developed by certain chemical combinations and changes which take place in the atomic constituents of the blood in the vessels of circulation. Fever is an excited or preternatural action of the capillary vessels, and may be developed by various causes, which, with few exceptions, are primarily of depressing agency. Cold is a frequent one—the influence of which in developing reaction and fever, I shall now explain; first observing, that the effect will be various in character and degree, in proportion to the amount of cause or disturbing influence on the capillary circulation, and the conditions of the blood and the fulness of the vessels in general.

253. The immediate effect of cold upon the surface of the body is to rob the capillaries of the part exposed of a portion of their caloric, and thus reduce their temperature be-

low the point compatible with the perfect exercise of their function. The circulation of the blood through these vessels is therefore retarded; by which retardation the primary series of these vessels, their arterial ramifications, become distended; and further, as certain chemical changes now take place in the blood in the arterial vessels which should have taken place at an ulterior or more advanced stage of its circulation, these vessels, which are more vitally endowed, and especially so in their smaller and capillary extremities, become preternaturally excited, in relief of the oppression and obstructing cause.

254. This illustrates the ordinary reaction and glow of heat which follows the cold-bath or other slight exposure to cold. This, although very difficult to prove, is fully borne out by the experiments of those two celebrated professors of our art, Sir Astley Cooper and Mr. Coleman; who found that, although venous blood is at first the hottest, arterial blood progressively becomes the hotter of the two. The chemical changes and development of heat are therefore progressive in the blood; which at once offers a satisfactory explanation of the cause of arterial excitement on the blood's retardation through the capillaries, as I have shown, and which views the experiments of Mr. Travers on inflammation very satisfactorily support.

255. To the explanation afforded of the reaction produced by cold upon the surface of the body, I would add, to produce fever, augment the amount of cause, or cold, to the extent of arresting the skin's function in perspirable secretion—which it will be remembered amounts to two pounds or more per diem—and the consequence will be, the retardation of blood in the arteries in a greater degree, when the aorta, or main trunk, will become distended, and the heart and brain (the two organs more particularly affected by the aorta's distension) will be supplied with an additional quantity of blood, and will in consequence become

preternaturally excited. This constitutes the condition of simple fever, marked by increased frequency of pulse, with augmented heat and sensibility of the surface, and often also with throbbing and pain in the head; the condition of the capillaries in this case being in reality, as I have elsewhere explained, that of *irritation*, in contradistinction to inflammation. The heart and brain I have noticed as the organs more particularly affected by the aorta's distension. The circulation in the brain I before mentioned must be influenced and increased by the aorta's distension, seeing that the blood has to ascend in the carotids in opposition to its gravity, the arch of the aorta favouring at the same time the blood's downward progress: and as respects the heart, from the circumstance of the coronary arteries arising by acute angles, or rather being reflected back from the aorta, and immediately this vessel proceeds from the heart, its supply of blood must be materially augmented by the aorta's distension.

256. *A severer Form of Fever.*—Should the cause, however, be more aggravated in degree, or exposure to cold be longer in duration, the morbid influence will extend from the surface to the subjacent tissues, and will retard capillary action in those parts also, or it may involve the whole system; or the patient may be in a state of inanition, or the blood be in a condition less favourable to the development of excitement, when instead of increased capillary action and excitement of the system, depression of the heart's power and of all the functions will follow. The heart in this case being enfeebled and oppressed, accumulation or congestion of blood in the bowels and liver, for reasons I have so repeatedly given, and other remote parts of the circulation, will ensue; a sense of fulness and oppression about these organs will be complained of, and in some cases exudation from the congested veins of the bowels, for their

relief and that of the associated organs, will take place; and hence the frequency of diarrhœa from cold, as I have previously pointed out. The stomach also will in many cases be sick from distension of its veins, as well as from indigestion, from defect of excitement of the organ, and from oppression of the brain, which is often considerable, the unyielding bony case of the brain not admitting of pressure of the organ *ab externo*. Hence, on the sucking power of the heart being reduced, venous blood must here accumulate, and giddiness and headache be the consequence; and from the same cause extending to the spinal marrow, muscular pains will often be complained of. And from the same cause also, or the cold's influence extending to the vessels of the muscular fibre, are the symptoms of shivering and cold to be explained, as well as a sense of malaise, feebleness, and a weak pulse, which constitute the early stage of the severer forms of fever. The symptoms of excitement become in this case developed by the venous congestions which implicate more or less all the organs. But whether this is brought about by its direct influence, as in the first instance, in consequence of the obstruction in the veins occasioning changes to take place in the containing blood of the arteries, which should be effected at a more advanced stage of its circulation; or that it is otherwise brought about in consequence of the congestions in the remote parts being considerable, and withdrawing so much blood from circulation through the lungs, (occasioning thereby a more hurried respiration, and an increased absorption of oxygen, inducing thereby a more vivid combustion, and in consequence excitement of the system,) it is difficult to determine. But one or the other, or both, it unquestionably is, and the result is, general excitement; developing inflammation, but too frequently, in those organs more particularly congested, or in which predisposition exists, or susceptibility of structure disposes to be thus affected;

and more or less in degree, according to the condition of the blood, or other circumstances of like nature, as will be pointed out more particularly when the various forms of fever come to be severally treated of.

257. *Frequency of Fever: its Cause.*—From the foregoing explanation of fever, it is obvious that any other depressing cause, limited in degree, besides cold, in its effects upon the circulation, may produce the same result: hence, the universality of fever—malaria, indiscretions in diet, derangements of the secretive organs, and a variety of agencies, depressive in their character, producing the same effects. The cause must, however, be limited in degree, or the result will be poisonous to the capillary vessels; or, in other words, the blood will be so depressing in its character, or deteriorated in quality, that the chemical changes in its composition upon which life is dependent, will be altogether arrested, as in ordinary cases of poisoning. Or if the blood be not deteriorated to this extent, capillary action will nevertheless be diminished below that point which is compatible with the development of re-action; often in such instances giving rise to other symptoms curative by evacuation, as in the case of cholera, and the vomiting and purging which so generally attend poisoning. It is also deserving of notice, that at the time and by the means which Nature adopts to bring about this general excitement of the system, she, by the distension of the vessels of the liver, bowels, and stomach, arrests the absorption of sustenance, &c. from these quarters, the energies of the system being so much required elsewhere; and there accordingly ensue not only loss of appetite, but also disorder of the stomach's function, to the extent often of vomiting being induced, to the excitement of the heart, the brain, and the respiratory function, in relief of the system.

258. These are all beautiful provisions of the system—

displaying the handywork of Nature—brought into operation at all times and in all emergencies of the system; and if not exactly directing us what we should do in all cases, yet imparting in general some very useful information.

259. *Indications of Treatment in the Simple Forms of Fever.*—Now, what are the indications of treatment in the simple form of fever from cold? We may reply with certainty, to restore the secretion of the skin, and remove the effects which have ensued from the suppression of its function. The first object can only be effected by moderating the excitement of the system—the circulation being in this case, as in the like affection of the nostrils from cold, too active to admit of secretion taking place. This is a fact well exemplified in another variety of fever dependent upon a very different cause, namely, malaria, with which the blood becoming contaminated, a sense of extreme cold, shivering, and great depression of the powers of the system, and congestion, ensue; symptoms which are succeeded by high febrile excitement;—and in this case, as the excitement moderates, (the re-action being quite secondary,) perspiration follows, and is often copious in the extreme, seeing there has been no previous specific torpor or depression of the function of the cutaneous capillaries, as in the former case.

260. *Operation of Remedies.*—The next consideration is, how is this general excitement best moderated? A warm or rather tepid bath at once suggests itself, from its power of diminishing the action of the capillaries by absorption of the water and the relaxation of the cutaneous surface exposed to its influence, and which I would accordingly recommend; but to its successful employment, the immersion should be continued for an hour, and it should be repeated every three or four hours, or oftener, till the purpose is fully accomplished. The same purpose may be attained by the con-

tinued application of a wet cloth surrounded by flannel to the whole of the abdomen, renewing it occasionally, if dry or cold, in accordance with the feelings of the patient. In like manner as the skin partially exposed to cold will often develope fever, so may its being partially influenced by a bath in this way remove it. Another method of moderating excitement is one frequently practised, namely, that of introducing a remedy into the blood which will diminish the amount of its chemical action, or otherwise influence the function of the organs. This is the mode of operation of some descriptions of saline mixture in these cases, as well as of antimony, ipecacuanha, and opium, all of which act directly by influencing the blood by admixture with it, or indirectly by their operation in exciting some of the functions in antagonism to the skin, as that of the kidneys, or nauseating the stomach, and thus occasioning increased mucous secretion from its lining membrane into the stomach and bowels, and so influencing the cutaneous surface with which this membrane is essentially connected, or, indeed, is a continuous surface.

261. *Rheumatism, Sciatica, &c., developed by Cold.*— The effect of cold, however, in too many cases, is not confined to the cutaneous surface, its influence being extended to the subjacent and inward parts; thus, in the case of the chest, when, perhaps, more particularly exposed, developing inflammation of the pleura or lungs; in other cases, implicating more particularly the lining membrane of the abdominal cavity, and thus developing inflammation of the peritoneum; and in others, inflammation of the bowels, kidneys, or other organ predisposed, or more particularly susceptible to attack: or, in the case of the limbs, inducing congestion, irritation, or inflammation of the sheaths of the muscles, or covering membrane of the joints; and thus rheumatism, active or passive, acute or chronic, is induced:

or affecting, in some cases, more particularly the sheaths of the nerves, and thus inducing sciatica and other forms of neuralgia; or, it may be, the membranes of the spinal marrow, occasioning similar affections, as well as spasms or cramp, or convulsions; and, indeed, locked jaw, or apoplexy, may be thus induced. Most of these are common effects of cold, directly or indirectly brought about, by its operation on the system under different circumstances of exposure, constitutional tendency and condition of the blood, or state of the system at the time of attack. These, too, modified by circumstances, may occur in single groups, or be otherwise variously complicated, and hence the number and variety of nervous, as well as inflammatory affections arising from cold.

262. *Treatment of Inflammation of the Lungs and Bronchi.*—Reverting to the subject (from which we have so long digressed) of the affections of the air-passages induced by cold, and of inflammation of the lungs and their membranes,—we shall now, from our knowledge of fever, be able to determine what are the indications of treatment in every particular instance. As the severer affection will necessarily embrace the milder, from which it differs only in degree, we shall treat of inflammation of the lungs and of the bronchi in the first instance. The symptoms of this are pain in the chest, cough, hurried and difficult breathing, and a dry nostril, attended with the symptoms of fever, heat of skin, and increased frequency of pulse. These are the especial symptoms; and now what are the indications of relief? As the symptoms are obviously dependent upon excess of excitement, both local in the parts affected, and general in the system,—marked by the increased sensibility or pain of the part, and general heat which obtains, its moderation is the chief end to be accomplished. Excitement, if allowed to progress, or if not kept within limited bounds or mode-

rated, will be productive of certain changes in the blood, or in the condition of the part more particularly affected, which will be destructive to the organization, or otherwise materially alter the normal endowments or healthy condition of the part: hence, in the case of inflammation of the lungs, there occurs an exudation of lymph, and its deposition within the lungs' texture, solidifying its substance, and thus closing the air-cells, and lessening thereby the admission of air, which is no doubt a curative effort towards diminishing excitement, and may therefore be well accepted as a finger-post for our guidance. Or in the case of inflammation of the bronchi, or lining membrane of the air-tubes, this membrane becomes thickened in substance, and its mucous secretion increased, and in this way the absorption of air is diminished, and excitement is moderated. Observing Nature, therefore, the indication is clearly pointed out to us, to moderate excitement. And accordingly the warm bath, the tartrate of antimony, saline mixtures, bleeding, and diluents, are the remedies.

263. *Importance of Bloodletting.*—I must now say a few words on the subject of bleeding—our most powerful remedy in the relief of excitement, as I have before stated. The action of the heart is dependent, not only upon the amount of electrical excitement it receives from the system at large, but also upon that developed in its own substance, or the quantity generated in its organic structure; and therefore to be materially influenced by the quality of the blood with which it is supplied, as well as the quantity circulating through its cavities, in the fulfilment of its function. If, therefore, a sufficient quantity of blood be taken from the system, it diminishes excitement in two ways:—first, it removes, or tends to remove, the congestive condition of the veins, and thereby the immediate cause of excitement. Secondly, it removes a portion of the combustible elements

of the blood, and in so doing influences not only the electrical development going on in the heart's substance, but that also of every organ. Thus the united effect of withdrawing blood is to reduce excitement, not only of a part, but of the whole system. Accordingly, the experience of all ages and nations proves bloodletting, judiciously practised, to be the most useful and powerful remedy we possess in the treatment of active fever and inflammation.

264. *General Treatment.*—I recommend, therefore, that bleeding, with these intentions, should be at once put into practice, to the extent of withdrawing from the arm from twelve to twenty-four ounces or more, according to the age and strength of the patient, and repeating the same in suitable quantity, during the first three days, at intervals of six or eight hours, if the other measures pursued during the period are not equal to the necessities of the case. Immersion in the warm-bath for half an hour or longer, at a temperature of 98°, or that which is most comfortable to the feelings of the patient, should be the next step; previously, however, relieving the bowels of their contents by a large dose of castor-oil, and assisting its operation, if tardy, by a large clyster of water-gruel. The bath should be repeated every four hours till the skin becomes perspirable; or where this is not available, a cloth wrung out in warm water should be applied to the chest and abdomen, removing it occasionally, as agreeable to the patient, and securing the part well from cold by a covering of flannel; or a poultice in like manner may be applied. In addition to these means, a saline mixture, with emetic tartar, to which some laudanum should be added, to allay irritability and coughing, may be given every two or three hours. The following is as good a form as can be desired:—half an ounce of liquor of acetate of ammonia, quarter of a grain of emetic tartar, and six drops of laudanum, in a wineglassful of water or of emulsion

of bitter almonds. The patient should be kept in bed, and in a moderately warm atmosphere, and the latter should be rendered humid by the steam issuing from several vessels of boiling water being placed around the room, or within the curtains of the bed.

265. The skin becoming perspirable, expectoration will ensue, when the treatment may become more local in its character, and attention be directed to other quarters; it is now that calomel will prove a most valuable auxiliary, repeating the mixture every four hours, and giving a grain or two of calomel in pill between each dose till the bowels are effectively relieved, when a large blister should be applied to the chest, and the skin being of moderate temperature and the pulse in accordance, omitting the mixture, and continuing a grain of calomel in combination with half a grain of opium and a quarter of a grain of emetic tartar two or three times a day, or oftener if necessary; gradually and cautiously returning, as the patient's health and appetite improve, from a fluid to a more nutritive diet. The diet during the preceding period should be confined to barley-water, rice, gruel, sago, arrowroot, and the like description of bland substances, and the same should be employed in all cases of acute inflammation and active fever.

266. In a less severe form of affection, or milder attack, a less active treatment will be necessary. The application of twenty leeches to the chest, and immediately they are removed, immersion of the patient in a warm-bath for half an hour, or when this is not conveniently available, applying a large bread-and-water poultice to the chest, renewing it every three or four hours, in conjunction with the saline mixture, with antimony, will be often all that is necessary: following these means up, however, by a few doses of calomel, strict attention to diet being at the same time observed, and a blister applied if necessary.

267. *Treatment of Pleurisy.*—If the pleura be the seat of affection, (marked by the pain in the chest and stitch in the side being more acute,) the leeching, poultice, and in due season the blister, should be invariably adopted, in addition to such other means as are called for by the case, as the former have a more immediate and direct influence upon the affected part. As in all cases of active inflammation of the lungs or pleura, there will but too commonly follow a certain amount of deposition or consolidation of the lungs in one case, or of effusion into the chest in the other, the calomel, from its deobstruent and peculiar stimulant qualities, is a remedy of much importance in the advanced stage, and should be given once a day or oftener. During convalescence it may be advantageously continued with a diuretic and gentle tonic, as an infusion of senega with potass, or decoction of bark and tincture of digitalis—the latter with the view of increasing the urinary secretion and giving tone to the debilitated vessels of the affected part, and thereby restoring their healthy condition: added to which, should there continue the slightest sense of pain in the chest, indicative of any remaining inflammation, a constant or occasional blister will be an indispensable auxiliary.

268. *Treatment of Cough.*—A simple cough, attended with but little or no fever, may be readily relieved by the application of a mustard-plaster to the chest. The mustard should be fresh mixed with hot water as for the table, but a little more fluid, and spread upon a napkin about the size of a cheese-plate, and then applied to the chest and wind-pipe, and kept on for ten or fifteen minutes, or as long as it can be conveniently borne, short of blistering, which will not happen within the period mentioned. This will prove a very useful remedy, and may be repeated every evening; taking also a teaspoonful of a mixture consisting of syrup

of poppies, antimonial wine, and paregoric elixir in equal proportions, every two, three, or four hours, according to the severity of the cough; abstaining at the same time from a stimulating or too exciting diet. These means will soon remove the cough: though it may be, and often is, advisable to follow them up for a few nights with a pill of calomel and aloes in relief of the secondary derangements of the liver and associated organs which so constantly succeed to cold; and from the neglect of which, though people often get well of the prominent affection of the chest, the patient yet remains for a length of time afterwards valetudinary.

269. *Treatment of Sore-Throat.*—Sore-throat is best relieved by the inhalation of steam and the application externally of a mustard-plaster, or a liniment of equal parts of spirit of hartshorn and oil on flannel. Sucking a piece of saltpetre, and gargling the throat with its solution in the mouth is also beneficial. When accompanied by fever, the warm-bath is desirable; and after relieving the bowels by a pill or two of calomel and aloes, if anything further be necessary, the saline mixture with antimony may be employed. In addition to these means, if the inflammation be considerable, the application of a dozen leeches to the throat, followed by a warm poultice, may be required; and subsequently, if necessary, a blister.

270. *Relaxed Uvula.*—Succeeding to cold or from other cause, a congested and relaxed state of the uvula and throat sometimes takes place. This is best treated by anointing the part, by means of a camel's-hair pencil or a feather, with a mixture of chilly vinegar and honey in equal proportions, three or four times or oftener in the day: this produces a copious flow of mucus from the parts, excites them, and empties their vessels. Sucking a piece of alum, too, is occasionally useful. Attention should at the same time be paid to the general health by the use of tonics, cool air, and exercise.

271. *Catarrh*—or the effusion of water or mucus from the nostrils, with loss of the sense of smell, is often relieved by the constant use of the smelling-bottle (ammoniacal salts); and when unaccompanied by fever, this will in general be all that is requisite, or in addition, if it be found necessary, a dose of thirty drops of laudanum, or ten grains of Dover's powder, may be taken at bedtime with a basin of gruel. But when fever exists, or there is much pain in the forehead, inhaling the steam of hot water from a basin, placing a towel at the same time around it to exclude the air and include the head, is another excellent expedient—with the use of the pills of calomel and aloes and saline mixture with antimony if necessary.

272. *Influenza; its Cause and Treatment.*—This affection is characterised by a sense of malaise, chill, lassitude, loss of appetite, attended in general with symptoms of catarrhal or bronchial affection, or sore-throat, and not unfrequently with muscular pains and headache, and more or less febrile commotion.

273. The cause is a damp, cold, and variable state of the atmosphere, impeding and deranging the functions of the skin and biliary organs. The same cause in a more aggravated degree, and associated with a low barometer and non-electrical state of the air, diminishing atmospheric pressure upon the surface of the body, and impeding thereby the blood's return to the heart, and weakening the system,—and further allowing malaria to ascend from drains, sewers, or the like, and otherwise favouring the development and ascent of exhalations from the soil, to elevations they would not otherwise attain, and thus bringing many persons under their influence,—such a combination of circumstances will necessarily give rise to a much more aggravated form of the affection—developing in certain conditions of the system rheumatic fever, scarlatina, and typhus fever. The treatment to the mild and simple form of affection will consist in

taking a pill of calomel and aloes once or twice in the twenty-four hours for a few days, in excitement of the secretions and in support of capillary action; or if there be catarrhal or other local affection, the pills before mentioned of calomel, antimony, and opium, every four hours, or the saline mixture with antimony and opium; and after the secretions by their agency have become free, and the febrile symptoms removed, a tonic to establish the health may be required. Half a pint of decoction of bark, taken in four doses during the day, or a grain of sulphate of quinine as often, will be the most suitable remedies, conjoined with a more nourishing diet and in some cases a glass or two of wine. The severer varieties of this affection, consisting in reality of typhoidal fever, will be treated of in a subsequent part of this work.

274. I have said nothing of the sequelæ of unsubdued inflammation of the lungs, bronchi, or pleura,—occasioning in the first instance vomica or abscess; in the second, thickening and ulceration of the mucous membrane; in the last, dropsy of the chest,—as these will seldom or never occur if the proper treatment is judiciously carried into practice at a sufficiently early period of the invasion. Were I to carry out these subjects in all their details, I might with equal reason extend my work to a complete treatise on medicine, which I have no intention of doing, my object being to disseminate principles for the treatment of the primary affections, embodying them at the same time in their practical application to the more frequent forms of disease, which if attended to, the secondary will seldom occur. I shall not, therefore, do more than glance at another but too frequent affection of the lungs, namely, phthisis, or consumption as it is generally called.

275. *Pulmonary Consumption.*—This, I must observe, is a disease specific in character, dependent upon some general

cause of derangement of the nutritive and healthy condition of the system; a disease, connected with some depraved or altered condition of the blood, in relation to its elements derived from without, or of defect in their assimilation, or in the purificative and secretive, or the nutritive processes; whereby there ensues a deposition from the blood of small granular albuminous bodies in the substance of the lungs; though not in the lungs exclusively, the same granular bodies, or tubercles, as they are called, being not unfrequently deposited in the peritoneum and bowels also; and often conjointly so with the lungs. Scrofula is a disease of a similar character, implicating more particularly the absorbent glands, and occasioning a deposition in their substance, with enlargement and subsequent inflammation and abscess in these parts. These tubercles often exist in the lungs without occasioning any very sensible inconvenience; but the lungs so affected, under the influence of cold, become more amenable to inflammation; and under a low and insidious form of it these tubercles increase in size, and then, compressing and occupying the space of the air-tubes, become a permanent source of irritation to these tubes, and of extended inflammation: hence cough, expectoration, febrile commotion, &c., ensue. The tubercles increasing in size, and the parts surrounding them being involved in one common inflammation, they coalesce, and either in distinct clusters or severally soften and become the seat of abscess, the contents of which communicating with the air-tubes, are now in part expectorated; a portion being also absorbed into the blood, and thus contaminating the vital stream, hectic fever, diarrhœa, and numerous secondary derangements ensue; from the exhaustion of which, and the destruction of the organization, death necessarily soon closes the scene.

276. I have detailed thus much, with the view of showing that there can be no specific remedy for this disease, (which,

like scrofula, is an affection of the general system,) and that all treatment must bear reference to the stage of affection. In the early stages it must be sought in the causes which gave rise to the tubercles: attention must not be directed alone to the relief of the cough and the symptoms of inflammatory irritation, but to the condition, so to speak, of the blood, or the depravation that may exist, of whatever kind, of the assimilative and nutritive processes, and of the general health and strength of the system. Strict attention to diet, air, exercise, warmth, clothing, and the like expedients of renovation, are evidently the remedies. And seeing that these bodies (the existence of which may be determined by auscultation and percussion of the chest—that is to say, tapping the outside and noticing the sound imparted of vacuity or consolidation, and of the air's murmur within—) are soluble in an alkali, as my friend Dr. Campbell has proved by experiment, an alkali may very probably be taken with advantage, as he has recommended. And an occasional vapour-bath may be employed to secure a more active state of the functions of the skin, and prevent at the same time the development of inflammation. Sponging the chest every morning with salt water, and the daily use of the flesh-brush, are also useful auxiliaries, as also the shower-bath when it can be employed.

277. Cough, irritation, and fever, when these are present, must be treated upon the principles previously pointed out; and in such cases an issue or seton or perpetual blister on the chest, I am of opinion, may be very judiciously employed. In the more advanced stage, when abscess is formed, liberating its contents by an opening through the chest—wherever this can be accomplished, as has been recently suggested, and I believe practised—cannot, I think, be too strongly recommended, as death is more frequently occasioned by the absorption of the pus, or putrescent matter of

the abscess, and the consequences it gives rise to, than from the destruction of the organization, which the powers of the system are, under other circumstances, we know, often capable of repairing.

278. *Probable Cause of Pulmonary Consumption.*—I will now venture an opinion upon the cause of these tubercles. They appear, from the experiments of Dr. Campbell, to consist principally of albumen. Now the serum or fluid part of the blood consists of an alkaline solution of albumen. Is it not probable, therefore, that these tubercles may be formed by the action of an acid secreted by the part affected or eliminated under particular circumstances, neutralizing the alkali of the serum—which is alone circulated in the finer tissues and the very delicate membrane in which these tubercles are formed, and thus occasioning their deposition? But whence this acid? I would reply, probably it is that which should have been eliminated by the skin, and which the lungs, associated in function, in these cases attempt to do; for the secretion of the skin, as everybody in India knows who has ever put the back of his hand to his lips, is pungently acid. I can see some objections to this view of the subject, but the idea is forcibly presented to the mind by the fact, that persons liable to be so affected are for the most part those who take little exercise, and who must in consequence excrete but little from the cutaneous surface; and we see also, that natives of India brought to this country (and monkeys and tigers also) very generally die of this affection, which in the former may be induced by the arrest of this, to them in their climate, very active function.

279. These views meet with singular support in the experiments of M. Forncoult, which while these sheets have been passing through the press, have been reported in the London Medical Gazette of March 27th. He infers that the skin is solely an excreting organ. Its function, he says,

is to throw off the free lactic acid and lactates present in the blood. If this acid be retained, it destroys the equilibrium of the organic affinities, and precipitates albumen upon the urinary organs. He particularizes the urinary organs, seeing that upon plastering the skin of an animal all over with an impermeable coating, and thus arresting the skin's function, the urine invariably became albuminous. If this be the case, there can be no difficulty in conceiving that the gradual arrest of the skin's functions may induce the deposition of albuminous matter in the lungs and other textures of the system; and more especially in the lungs, seeing that Mr. Rainey has recently demonstrated that the tuberculous matter is deposited in the terminal air-cells, which are not lined, like the air-tubes, with a mucous membrane, but with an especial and more delicate membrane only, which may thus secrete this acid and precipitate the albumen from the serum, which can alone be circulated in so delicate a structure; indeed I can see no reason why carbonic acid, which may abound in the blood when the skin's function is impaired, and which must be exhaled from the blood through this membrane, should not of itself occasion the deposition.

280. *Asthma; its Causes and Character.*—The affections of the lungs which I have hitherto mentioned, are all of a character implicating the vessels of their structural endowments more particularly, and little influencing the capillary vessels in which the lungs' function is performed; but the affection of which I am now about to treat—namely, asthma—is of the latter kind. I believe asthma to consist principally in congestion of the functional capillaries of the lungs, arising from enervation developing a spasmodic and irritable state of the air-cells, with symptoms of great oppression and difficulty of breathing. This congestive state, if continued, will necessarily be productive of inflammatory

irritation of the more highly endowed structural capillaries of the organ, and hence chronic inflammation of the mucous membrane of the air-tubes will ensue, occasioning cough, expectoration, and so forth—the ordinary condition of the asthmatic subject.

281. The enervation of the lungs may be occasioned by cold, or certain other conditions of the air to which those predisposed to this disease are more particularly or exclusively amenable. The attack in cases of the more exclusively spasmodic kind, may be occasioned, and is not unfrequently so, by derangements of the stomach and digestive organs, between which and the lungs nervous connexion not only exists, but is most intimate, by means of the pneumo-gastric nerves.

282. Valvular derangements of the pulmonary side of the heart, or defect of the heart's propelling or sucking power in relation to the lungs, would be productive also of congestion of these organs. And again, there are certain conditions of the blood in relation to its constituents—its abounding in certain elements which should have been excreted by the liver and kidneys, or the skin—which may, and I know do, affect the pulmonary mucous membrane. This its secretive function it may arrest, and thus congest, or otherwise excite to irritation, or to increased mucous secretion; and by these means, which I believe to be the common causes of the affection, the pulmonary function becomes disturbed, and the asthmatic attack developed.

283. With these views of the disease, what are the indications of treatment? In the first instance we have given of enervation, the restoration of excitement to the pulmonary capillaries, and the removal of its effects, (congestion of the organs,) are obviously the principal objects deserving attention; and with these intentions, if available, there is no remedy which offers such immediate prospect of benefit, as

the inhalation of oxygen or nitrous oxide gas; a few quarts of either, there is good reason to suppose, would afford immediate relief. We have the evidence of Dr. Thornton, that these gases have been most successfully employed in these cases; and it accords with the nature of the affection that it should be so, as well as with the indications of Nature, as evinced by the craving for air which characterises the disorder. Electricity, or galvanism, is another remedy indicated, and which Dr. Wilson Philip has, it is said, very successfully employed.

284. Bleeding from the arm, to the extent of from twelve to twenty ounces, in relief of the congestion, and a mustard-plaster to the whole of the chest, are remedies also strongly indicated. I have often prescribed an active emetic (two or three grains of emetic tartar dissolved in an ounce of warm water) with great benefit. When this has completed its operation, it may be followed up with a pill of three grains of calomel in combination with two grains of opium, taking at the same time twenty drops of spirit of camphor with a teaspoonful of nitrous ether in a wineglassful of water every hour till relief is obtained, and after this an active purgative.

285. When relief is obtained, and benefit procured by repose and a little nourishment, attention should be paid both to the prevention of return of the attack, and to the removal of any of the consequences to which it may have given rise, namely, inflammatory irritation of the bronchi, or the like. In chronic cases, after due depletive measures have been resorted to, an ounce and a half of the infusion of seneka, with twenty drops of tincture of cantharides, and as much solution of potass, (which will act as a diuretic,) or ten drops of spirit of turpentine, two or three times a day, are often useful remedies; with an occasional pill of calomel and aloes to maintain an active condition of the liver's func-

tion, and thereby remove from the blood and prevent the accumulation of a surplus amount of hydro-carbonaceous matter, which may prove the immediate cause of the attack, calling, as it would do, for an increased supply of oxygen for its combustion and removal from the blood.*

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*. The following is the substance of a communication to the editor of the "Lancet," and published in that journal of the 5th of April, 1845. I have introduced it here for the benefit of those who are disposed to try the remedy; experience having proved to me, that simple things are not always to be despised:—

"A friend of mine, who is the subject of spasmodic asthma, having accidentally seen in a Staffordshire paper a paragraph recommending the inhalation of the fumes of the nitrate of potass as a remedy for that complaint, was induced to make a trial of it. He had previously employed various remedies, but with only very partial and temporary relief. The experiment was attended with the most complete success. He made use of a piece of blotting-paper, about the size of his hand, dipped in a saturated solution of the nitrate of potass, and afterwards dried. This was placed on a common plate, and being ignited, the fumes were speedily sensible in the room, which was a small one. He described its operation 'as clearing the passages, and gradually opening the air-tubes.' He said that the respiratory murmur became louder, and less stridulous, under its continued influence. The effect was always produced in about a quarter of an hour, and though he had used the same remedy nearly twenty times, he had never been disappointed in the result. As I have had many opportunities of ascertaining the urgency and frequency of the asthmatic paroxysms in this gentleman's case, and can place every reliance on the veracity of his statement, I think it may be of advantage to put his case on record."—*Lancet, April* 5, 1845.

CHAPTER XI.

FEVER IN ALL ITS FORMS — INFLAMMATORY AND TYPHOIDAL: CONSTITUTING BILIOUS FEVER, AGUE OR INTERMITTENT FEVER, SCARLATINA, RHEUMATIC FEVER, ERYSIPELAS, CONGESTIVE FEVER, &c.

286. *The Essential Character of Fever.*—I have already explained what constitutes fever in its most simple form, as occasioned by cold. I shall now speak of its varieties as occasioned by other causes. Fever may be defined to be a state of system under more or less general preternatural capillary excitement—the condition virtually of *irritation*, (but of a more general character,) in contradistinction to inflammation, which is the same in kind, but local in character, and augmented in degree; and hence, when the latter is considerable, there is developed a greater or less amount of heat and general excitement of the system; or, in other words, symptomatic fever.

287. *Fever divisible into two Orders, Inflammatory and Typhoidal.*—If there be any truth in the above statement, or in the views in which I have exhibited fever, it must appear that fever can scarcely be regarded as a disease at any time, but as a curative effort of the system to relieve itself of some oppression or perturbating cause of healthy manifestation. This is very strikingly exemplified in the illustration given of the influence of cold in the development of fever; and it will be found equally true in all other cases, a few perhaps excepted—the causes of fever in general being the influence of some depressing agency upon the system. The

exceptions adverted to are those which give rise to the directly inflammatory types of fever. These, it will soon appear, are few in number; but as they do exist, and as fevers of the same character are frequently secondarily developed, fever may be very conveniently divided into two orders—the Synochal, or Inflammatory; and the Typhoidal, or Depressing.

288. *Inflammatory Fevers.*—The *direct* causes of inflammatory fever are, as I have already said, but few, and confined, perhaps, to the excitement of spirituous beverage, or acrid poison in the blood, or other agent of direct irritation and excitation of the circulating system. But, the *indirect* causes of this form of fever are numerous: cold, as I have already explained, in its effects upon the cutaneous surface, is the most frequent one, acting upon a system favourable to this form of prolonged excitement; that is, on persons for the most part who were previously in health, and especially those plethorically disposed, or whose blood abounds in combustible particles: hence excitement is maintained, and the fever is continuous, as long as this condition exists. Another frequent cause of this indirect form of inflammatory fever, is biliary engorgement and derangement—the blood abounding in hydro-carbonaceous combustible elements, of which it should have been divested by the liver. The exciting and developing cause of fever in these cases, however, are very generally exposure to cold, or the excessive use of stimulating beverage.

289. *Typhoidal Fevers.*—On the other hand, whenever the blood is impoverished, or contaminated with malaria or other sedative agent, the type of fever is of the typhoidal or depressing order, and is characterised by certain periods of exacerbation and remission, and partakes therefore, in all such cases, of an intermittent or remittent character. The immediate cause of excitement in these cases is the conges-

tion in the veins—which being progressively accumulative to the amount necessary to the development of fever,* whenever the congestion is removed by the arterial excitement which eventually ensues, the excitement of fever ceases; but it necessarily recurs afresh with the congestion, as in the first instance, if the cause which gave rise to it be not in the interim removed, or its effects obviated—that is, so long as the system retains sufficient power, or, in other words, the capillary vessels possess adequate susceptibility to impression, but which sooner or later must be exhausted by this untoward action, and the complications of disease which ensue. Hence it is, from the debility that succeeds to the continuance of ague or intermitting fever, that the quotidian succeeds to the tertian, and the remittent to the quotidian form; and also, that the typhoidal so constantly succeeds the synochal order of fevers.

290. *Inflammation superadded to Fever.*—Superadded, however, to this idiopathic fever, in proportion to the severity of the cause, susceptibility of structure, or condition of parts, and the state of the patient with respect to fulness of vessels and condition of the blood at the time, will topical engorgements, or inflammation, be concomitant, which congestion or inflammation will in general, for reasons we have already given, be seated in those parts of the system the most remote from the heart's influence—which being, as I have before explained, in the stomach and bowels more particularly, and in the head, explains how both Clutterbuck and Broussais have respectively been led, by their post-mortem inquiries, to the mistake of assigning to these organs the exclusive seat of fever. In like manner, in the case of the parturient female who is the subject of this or other febrile cause, the womb, or its investing membrane,

* By increasing aërial absorption in this case, I am of opinion; the congestion withdrawing so much blood from circulation through the veins.

(the peritoneum,) often becomes the subject of inflammation; and hence the inflammation of these parts in puerperal fever, and that the especial treatment required in these cases, is characterised by the existing form of fever.

291. *Malarious Fever.*—Reverting to malaria, we have analogical illustration of this cause of excitement in the operation of other sedative agents upon the system. Opium may be mentioned, small doses of which produce primarily a certain degree of excitement; and the same effect follows a less degree of cold than is productive of fever, as in the cold bath; whereas a large dose of opium induces an opposite effect, it being followed, if the dose be poisonous, by overwhelming cerebral congestion, which is exactly what takes place in the severer attacks of cholera and congestive fever from malaria, the cause being so virulent in character, that excitement becomes wholly suppressed, or, in other words, the blood is poisoned, and the arterial capillaries torpified, and rendered not susceptible to the development of reaction, or but very inconsiderably so. The same explanation holds equally good in the continued exposure to the severer degrees of cold, by which the respiratory function is arrested, coma or apoplectic stupor is induced, and sleep, and finally death, are occasioned.

292. *Hæmorrhagic Reaction, or Fever from Excess of Bloodletting.*—There is another cause of fever, however, which has been treated of by Dr. Marshall Hall, well meriting attention, as forcibly illustrating the operation of sedative agents, and debilitating causes in general, in the production of excitement. This is the reaction or excitement following hæmorrhage, or excessive bloodletting. The loss of an undue quantity of blood is productive of general torpor or debility in the first instance, and this is followed by excitement, and is succeeded by exhaustion or collapse; —the same progression of symptoms exactly which takes place or succeeds to the other debilitating causes of fever,

and which may be thus explained. From the loss of blood sustained, the quantity returned to the heart not being sufficient, on contraction of the left ventricle, to distend the aorta, little is carried to the brain ; and from the same cause, (imperfect distension of the aorta,) little would at the same time be carried through the coronary vessels to the heart itself : hence the organic structure of both heart and brain not being duly excited, torpor of their functions, and debility or syncope, ensue. This is the primary effect, and is necessarily followed, as previously explained, by venous congestion in the remote parts, and the latter by excitement ; provided the system retains power sufficient to maintain the reaction, or the quality of the blood is such as is necessary ; or the capillaries retain their susceptibility to impression, but which necessarily becomes exhausted by preternaturally increased action : hence follows collapse, in like manner as mortification, or the death of the part, succeeds to unsubdued inflammation.

293. The same views are equally well supported by the operation of the opposite class of agents upon the system ; heat in moderation producing excitement ; excess of heat, debility ; and extreme heat, as by burning or scalding, mortification of the part, and death ; wine or alcohol, also, in reference to quantity, producing exhilaration, atony, and death. All this supplies a mass of evidence which appears to me so irresistibly conclusive of the justness of the views of fever which I have enunciated, and the explanation afforded of its phenomena, as to convert what would otherwise appear mere hypothesis into a satisfactory theory of those affections of the system in all their varieties.

294. *General Indications in the Treatment of Fever.*— In thus viewing fever, what are the indications of cure ? Assuredly not exclusively, in any case, the subduing of excitement, or the symptoms of inflammation, should symp-

toms of the latter kind even have become more particularly manifest; as the former, (febrile excitement,) I have rendered pretty evident, is only an effect of direct curative tendency; and the latter (inflammation) is also developed by the same agency, and with the same views, but under less favourable circumstances. Notwithstanding this, such is the mode of treatment recommended by many of the most talented writers on the subject; which, with the too prevailing doctrines of Broussais, and some others, (founded upon the post-mortem examination of such cases of fever,) directing us to look upon fever as in all cases symptomatic of inflammation, are daily and hourly most destructive in their consequences, and call for decided refutation!

295. No! febrile excitement is only an *effect*, and in the majority of cases (the indirect and typhoidal, which are doubtless the more frequent descriptions of fever) an effect of a morbid or ill condition of the blood. It is not only an effect indeed, but a curative one, which, however proper it be to moderate or keep it within due bounds, it is clear, should never be the chief aim of the practitioner to subdue. Our chief efforts should in this, as in all other cases of disease, be directed rather to the *cause* (the condition of the system,) remote and immediate, which gave rise to it; and as this, in inflammatory fever, may depend upon, or be associated with, repletion of vessels, or the over-stimulating quality of the blood, on the one hand, or the reverse of these conditions in the typhoidal form, the treatment must be varied accordingly. In the first case of inflammatory fever, in reference to both cause and effect, bloodletting is of direct curative application, and in conjunction with means of the same depletory and sedative tendency, (already detailed when treating on the subject of fever from cold,) experience proves, is the most successful practice. But however useful bloodletting may be in the foregoing condition, it is a

remedy of very secondary indication in the treatment of typhoidal forms of fever; though doubtless a remedy capable of fulfilling certain indications of curative tendency in the treatment of these also, if judiciously employed—with views, however, often diametrically opposite to those from which it is employed in the former instance. The chief indications of treatment in this form of fever, I repeat, bear reference rather to the predisposing or exciting cause or causes, remote or immediate, giving rise to it, than those of moderating excitement.

296. *Modifying Causes of Fever.*—Before proceeding further, another observation is required, viz., that the type of fever and the grades of malignancy are modified to a considerable extent, not only by the constitutional state of the individual at the time of attack, but by the nature of the exciting cause. The primary or remote cause, in the case of malarious inhalation, is often not of sufficient concentration for the development of fever, without the aid of the latter—a predisposing or exciting cause. Hence it is that some persons escape the attack of fever, intermittent or the like, till some time after removal from the source of the malarious emanation, when some accessory agency or exciting cause—as exposure to cold or other debilitating agency—develops its action and the attack of fever.

297. *Causes of Typhoidal Fevers.*—It will be remembered that I defined malaria to be the gaseous production of organised substances, both animal and vegetable, in a state of decomposition. As a cause of fever, I would not, however, limit the application of the word to the gases resulting from the direct decomposition of such substances, there being other exhalations and deteriorations of the atmosphere which produce similar effects;—for instance, a number of persons inhaling a confined atmosphere, and particularly such an one as must be respired by the inha-

bitants of filthy, damp, unventilated cellars, or in the hold or lower decks on shipboard; independently of the exhalations which arise from the decomposition of sapulent wood and other organic substances in the latter case. That these, particularly the first-mentioned, are not unfrequent causes of fever, is unquestionable. In illustration of this may be mentioned the fact recorded of Mr. Howell's party, thrust into the black-hole of Calcutta, the survivors of which were, it is said, immediately attacked with typhus fever, and carbuncles, as in plague. From the like condition of atmosphere taking place about the persons of the sick, in dirty unventilated apartments, is it that contagious emanations become elicited in such situations. Hence, likewise, as the cause of the severer species of typhus, we may infer, the conjoint operation of the greatest combination of the requisites to that end, or the remote cause in the highest degree of concentration. Thus it is, that the miserable, half-starved, and too commonly depraved inhabitants of filthy, damp, unventilated cellars, or the like description of cabins in Ireland, are the most frequent subjects of these attacks; and that all the grades between this form and intermittent fever —the mildest species of this order of fevers—are but modifications resulting from the more or less favourable combination of causes of fever, and states of the system conducive to its development.

298. *Especial Indications of Treatment of Fever.*— If the views I have taken of fever be correct, the principal indications of treatment obviously bear reference more particularly to the cause or causes which gave rise to it. In that arising from cold, I have already detailed the line of practice that should be pursued. In the fever originating in exsanguination from hæmorrhage, or the like, or inanition, or impoverishment of the blood, the stage of excitement should be moderated or kept within due limits by

tepid ablution of the skin, or when the case admits of it, the cold affusion ;* and for internal administration, water saturated with carbonic acid gas, saline mixture, cool enemata, and the like gentle means ; and milk or a farinaceo-gelatinous, or other light nutriment, should be afforded—suitable, be it remembered, both in quality and quantity to the weakened state of the digestive and assimilative functions. At the same time it must be borne in mind duly to support or sustain capillary action to the point of health, as nearly as it is possible in this weakened state of the system, by wine or other cordial given in the smallest quantity that will fulfil the purpose, whenever the circulation is below par ; whereby the recurrence of congestion, and consequently the return of fever, will be prevented.

299. *Caution to be observed in the Administration of Opium in Fever.*—It is in such cases as above described that opium has been so generally advised ; and a most useful remedy it is when judiciously employed. Its operation on the system, it will however be remembered, is threefold. In small and repeated doses, or in a moderately large one, it is stimulant in the first instance ; this is succeeded by quietness and sleep, and these by exhaustion equivalent in most cases to the previous excitement. In having recourse to this remedy, we must therefore bear in mind the indications of the period or stage of fever at the time being,

* Dr. Wilkinson observes, that whenever the pulse exceeds 120, it may be generally concluded that its frequency is the result of constitutional debility, the reduced energy of the heart compensating for power by more frequent feeble pulsations. "In cases where the skin is hot and dry, or the pulse exceeds 120, the tongue parched, how grateful to the feelings is the cold affusion ! The heat of the body is rapidly diminished, the irritating dryness of the skin is removed, and the pulse reduced to that standard which allows of a quiet slumber and a gentle perspiration."

so that the patient may have the full advantage of the restorative ageney of balmy sleep, as well as that of the stimulating operation of the opium at the proper periods; antieipating also and providing for its sueeeeding effeets and stage of exhaustion by the administration of suitable eordials; or eongestion and fever may ensue. The powers of the system must therefore in this way, and in every partieular, be earefully husbanded; and every eause of exeitement and expenditure of power, by rising from the bed, reading, talking, and even thinking, be eautiously avoided: great attention must withal be observed to seeure the patient fresh air, with immunity at the same time from eold.

300. *Indications of Treatment of Bilious Fever from Heat or Cold.*—Should the eause of fever be the suppression of the eutaneous funetion, and the retention in the blood of the perspirable elements, (the effeets of eold upon the system,) the indieations of treatment are, as I have before pointed out, the restoration of the perspiratory funetion, whieh is in general to be aeeomplished by moderating the attending exeitement. Or, should the same ageney operate upon the system predisposed to fever by the blood's abounding in exeess of earbon, the effeets of eontinued torpor of the liver's funetion by eold or other debilitating ageney upon the powers of the system; or, in like manner from defeetive oxygenation of the blood, the effeet of eontinued heat, upon the system, as in a hot elimate or season—giving rise in either ease to bilious fever—the purifieation of the blood, by the exeitement of the seeretive and exeretive funetions, is the ehief indieation of praetiee; moderating, at the same time, the febrile exeitement that exists. And as in the eomposition of bile earbon is so large a eonstituent, and as the liver and the assoeiated organs are more partieularly the seats of engorgement, the exeitement of the hepatie funetion

is obviously the chief in importance. Hence calomel is of all remedies the most useful, conjoined with antimony and purgatives in fulfilment of the secondary indications. And as this cause of fever may be based upon or exist with a plethoric condition of vessels or inflammatory habit—favouring thereby the synochal order of fever in a more exalted degree, fever may run high in such cases, or inflammation become developed: and as the liver and bowels are more particularly the seat of engorgement, (and hence the præcordial oppression experienced,) so are they proportionably liable to inflammation in such cases, and derangement of function. Hence cholera-morbus, liver-inflammation, and dysentery—the diseases of hot climates and seasons, as well as diarrhœa and gastro-enteritis in this country, where aërial transitions are more considerable and the skin simultaneously subjected to such influence. These several affections require, in addition to the fore-mentioned remedies, the free use of bloodletting, the warm bath, blisters, and other appliances, as will be hereafter more especially detailed.

301. *Congestive and Remittent Types of Fever.*—The same cause of fever coming into operation conjointly with malaria, may, as I have elsewhere observed, so depress the functions of life, that reaction or excitement cannot, or otherwise will but very partially, take place: hence sporadic cases of congestive cholera occur both in this and tropical countries, from a milder cause than usually gives rise to that affection; and hence, likewise, from the conjoint but mitigated influence of one or other of those causes, arise the bilious remittent and compounds of this description of fever in hot climates and seasons, and the congestive and typhoidal fevers of this country: the treatment of which we shall speak of hereafter.

302. *Treatment of Intermittent or other Malarious*

Fever.—Again reverting to malaria as a cause of fever, of which intermittent fever or ague, is the most simple form and type of the order, the same indications of treatment, or the blood's purification, would appear to be the chief indication to be kept in view, and assuredly is, though perhaps not very readily, to be accomplished. Experience has proved to us that malaria, having taken possession of the blood, and giving rise to intermittent fever, adheres to it with a degree of pertinacity that will not readily yield to the ordinary means of accomplishing this, or allow us wholly to depend upon them. We may therefore conclude, that none of the secretive organs have any direct power of eliminating and divesting the blood of this aërial poison, in common with some other poisonous agents of this class. Hence we find fever and hydrophobia occurring often many weeks after the blood's impregnation with the virus, or, if I may be allowed the expression, after the seeds of the disease are sown. I have reason, however, to think, that this aërial poison might be eliminated by the cutaneous surface—seeing that Nature appears, by the perspiration which succeeds the attack of intermittent fever, to point out to us this as the remedy: and I would therefore most strongly advise the suggestion being carried into effect, and that the stage of perspiration should be maintained for a couple of days, or a much longer period, by antimonials, wine-whey, and other expedients of like character.

303. *Influence of Bark and Quinine in the Treatment of Fever.*—In the case of malaria, although it may not be in our power to divest the blood of its presence altogether by the excitement of the secretive organs, the effects of the poison on the system in inducing congestion of the viscera and torpifying and arresting the liver and secretive functions, it is in our power to obviate or remove by such means: and by the agency of another remedy we may supersede or annul

its more general action upon the system; and this effect I believe to be producible by the operation of the cinchona bark, or quinine, its active constituent. The effects of this remedy may be, therefore, to combine with and neutralize this poison, or to impart qualities to the blood incompatible with its baneful operation; or it may be that of a stimulant to the capillary vessels, more permanent perhaps than any other known to us—and hence its acknowledged qualities as a tonic, thus preventing the congestion of the veins which would ensue from the debilitating influence of malaria, and its consequence, capillary excitement. Whatever be its mode of action, however, general experience at all events testifies, that quinine or bark administered in a certain quantity supersedes the effects of malaria upon the system, and prevents the development or recurrence of intermittent fever, as well as many other varieties of this type of fevers. This it does, I would say, without reference to its mode of administration so much as to the quantity admitted into the system. The point to be aimed at is the blood's saturation with it to a certain amount; and this I have noticed in many cases to be marked by the following characteristic symptoms of its operation—a sense of fulness, or perhaps rather of tightness, in the head; singing noise in the ears; deafness, and obtundity of intellect; effects which I have very generally seen to follow the administration of twenty grains, in doses of one or two every hour during the period of the fever's intermission, or an equivalent quantity of the bark in powder; provided the stomach was in a fit state for its reception, and there is no congestion of its vessels to interfere with the absorption of the bark. When such a congestive condition exists, Nature very generally with her usual providence rejects it, or it produces oppression of the organ, and should not be continued till the congestion has been removed. The fever seldom recurs after the symptoms

indicative of the blood's impregnation with it, have become manifest; though it should be continued for some time afterwards, to maintain its influence. Such, at least, is my experience, which, be it observed, has been considerable in the treatment of fevers of this description, having held medical charge of the garrison of Seringapatam for a period of four years, where fevers of this order, from the simple intermittent to the exalted affection of typhus icteroides of authors, or yellow fever, are endemical throughout the year; and have, moreover, suffered much from visitations of the kind in my own person.

304. *Observations on Scarlatina, Acute Rheumatism, Influenza, and Erysipelas.*—From experience and observation made since my return to England, I am warranted in saying, that fevers from similar causes—malarious influence, variously modified by temperature, season, and a variety of circumstances, and assuming a variety of forms, (as acute rheumatism, influenza, scarlatina, and erysipelas,—and often of epidemic prevalence,) are of much more frequent occurrence than the profession in general are aware of;—a subject to which I would invite their particular attention, as calling for the use of this remedy, (bark, or quinine,)—which of late years, in the treatment of these varieties of fever, it has not been the fashion much to employ. To this circumstance, I am of opinion, is the frequent fatality of such affections mainly to be attributed; as I know of no remedy which can fill the place of this in the treatment of such cases of low fever, which it may be well to remark, are more particularly characterised by periods of intermission, exacerbation, or remission.*

305. *Convulsions and Apoplexy preceding the attack of*

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* A few of such cases I published in the "Lancet," of the 15th July, 1843, and which I have thought proper to append in illustration. (See page 218.)

Fever.—It will be obvious that the fevers of malaria may be, as in those forms which originate in the blood's surcharge with carbon, based upon or connected with fulness of system, or a condition favourable in other respects to the development of the synochal forms of fever; and thus may the attack be ushered in or preceded by great congestive oppression, apoplexy, or convulsions in the cold stage; and the excitement of fever which succeeds this may give rise to inflammation in some organ or structure in which predisposition exists or susceptibility of structure renders more particularly amenable to its influence; and as the viscera of the abdominal cavity and the brain, from the peculiarity of their circulation, are more particularly subject to congestion, so are they (the stomach, bowels, spleen, and head) also subject to inflammation. Hence the frequent affection of these organs in simple intermittent fever, and all the varieties of this order; as well as the imperfect intermissions and complications which so frequently ensue—in consequence of the inflammations which take place maintaining a continued local excitement in many of the species of this, the typhoidal order and remitting type of fever.

306. *The Cause of the Complications and Perplexity attending the severer forms of Fever.*—In this compound affection of inflammation—based upon a disease of direct debility, indicating, it would appear, two opposite modes of treatment, and requiring a very nice and discriminating practice—originates the diversity of opinion which exists among the profession, and the indefinite line of practice laid down by most writers for the treatment of such affections; but which I hope the explanation afforded will tend to remove, as I believe that it shows that the *general* treatment should bear reference to the cause and condition of the general system, and the *particular* treatment should be directed to the local affection. Thus may bleeding and

bark, calomel and cordials, be remedies not incompatible with each other—each having its due share and respective weight throughout the treatment.

In illustration of the utility of quinine in the cases enumerated, I here insert, from the *Lancet* of the 15th July, 1843, the following report of cases successfully treated.

307. "*Acute Rheumatism.*—On the Saturday preceding the Tuesday on which the election took place, I visited a hair-dresser, ætat. 56. I found him in bed, to which he had been confined for nearly a month with acute rheumatism, which had attacked him on the day succeeding to one that he had spent in the amusement of fishing. One of the knees had been first attacked with swelling and pain, which was accompanied with much fever; the disease then migrated into the other knee, and attacked also one of the wrists. The swelling and pain were now confined to one of his wrists. He had been bled, purged, and abundantly sweated, and was now profusely perspiring, and much attenuated. I immediately ordered him to take two grains of quinine every four hours without intermission. This he took, with the effect that the next day he was better, and on the Tuesday was so much improved as to be capable of attending the poll and giving his vote as an elector. He continued the quinine after this twice a day, and took an occasional pill of calomel and aloes for the period of about a month, and was restored by these means to perfect health.

308. "Another man I accidentally met limping about, by the aid of a stick, with a swollen knee. He was a butcher by trade, and told me that he had been for some time thus afflicted and incapable of work. Fever had accompanied the swelling of the knee in the primary attack. He had been twice in the hospital, on one occasion for ten and on the other for six weeks, during which time he had been salivated, leeched, blistered, used the baths, and had adopted many other

remedies, but with only temporary benefit. I directed him to take three grains of quinine three times a day, and to use a liniment composed of one drachm of sulphuric acid and fifteen drachms of olive-oil to the knee night and morning, rubbing it well in for half an hour at each time. A fortnight after using these remedies, he was so much benefited that he was not only capable of resuming his occupation, but declared that he was able to walk ten miles at a stretch.

309. "I was requested to visit J. C., aged sixty; he had been attacked two months before with acute rheumatism. The local affection had during that time migrated from ankles to knees, and thence into his shoulders and wrists: he had during the greater part of this time been under professional treatment, and had used the thermal baths. He was, when I saw him, hobbling about with a stick, with his ankles swollen and shoulders painful; he had suffered by diarrhœa two days before, and appeared cold and languid. I directed him to improve his diet, and take a pill containing two grains of quinine and a third of a grain of opium, three times a day. Three days after, when I next visited him, I found him in bed perspiring freely. He had taken eight of the pills. His wrists were swollen and extremely painful, his pulse 120 and firm, his bowels confined, and his breathing a little oppressed. He was now bled to twenty ounces, and a grain of calomel with three grains of antimonial powder, in a pill, were directed to be taken every three hours, with a drachm of sulphate of magnesia in solution. The next day I found he had been freely purged, and had passed a better night. The pills were now directed to be continued every four hours, and a fourth part of the following mixture was substituted for the sulphate of magnesia, to be taken between the doses of the pills:—Solution of acetate of ammonia, three ounces; vinegar of colchicum, two drachms; tincture of opium, twenty minims; water, five ounces.

310. "On the next day I found that he had passed an

excellent night; the pain had quite left his wrists; his pulse 84, soft; his breathing free; in short, that he was convalescent. I now ordered him the pills of quinine, as in the first instance, with one of the pills of calomel and antimony every night; and by these means he soon completely recovered his strength.

311. "*Scarlatina.*—I was requested by a lady, twenty miles distant, to visit her family as soon as possible, as a son and daughter were dangerously ill with scarlet fever. I reached the place of her abode the same evening, when I found the son had died two hours before. The daughter, a delicate girl, aged seventeen, was delirious in bed, with great difficulty of deglutition, a small irritable pulse at 120, and an excited skin. Leeches were then being applied to the temples, and powders of calomel and antimony being administered every two hours. The leeches I directed to be immediately removed, and sent for the medical attendant; on consultation with whom, on his arrival, as he declined any responsibility in the measures I thought it necessary to pursue, the case was thrown altogether into my own hands. The patient's skin was now sponged with tepid water, and the throat gargled, or rather mopped, occasionally with a large hair pencil, dipped in a mixture of strong chilly vinegar and honey, which produced a copious muculent salivation. Soon after this a grain of quinine, in solution, was administered, with a tablespoonful of port wine; and the same was repeated every two hours throughout the night, and two or three spoonfuls of sago and wine between each dose. On the following morning the throat was much better, the fever had declined, and she expressed herself as feeling in every respect better. The remedies were continued, and in the evening all danger was at an end. After this she continued the quinine in doses of three or four grains during the day, and was well by the end of the week.

312. "Another son and also a servant of the same family

were attacked the day after my arrival at the house, the disease being of epidemic prevalence in the town and for many miles around. They were both treated by an emetic in the first instance, followed up by a dose of calomel and jalap; and after the operation of this by a teaspoonful of bark-powder, with two tablespoonfuls of port wine, every two hours, with immediate convalescence; and this treatment becoming now general in the town, was very successful.

313. "*Erysipelas.*—An infant fourteen months old was attacked with erysipelas on the face, which extended down the neck to the chest, and down the arms to the finger-ends, the hands becoming œdematous. Calomel, antimony, and purgatives were freely administered for more than a week without permanent benefit; on the contrary, the disease was extending itself, and the child had become comatose. Under these circumstances half a grain of quinine was given every two hours, and a blister applied to the thigh. The amendment was almost immediate, and the child was two days after convalescent."

314. As I advocate in all cases attending strictly to Nature's indications, and as erysipelas in the severer forms develops a blistered surface—that is, blisters are formed on the skin—I am of opinion, that in all cases in which relief is not obtained by perspiration, (which should be early induced, if possible, by the conjoint influence of calomel, antimony, opium, and the vapour or the tepid bath, after due evacuation of the bowels, and bloodletting if there be much excitement,) a blister should be applied, not immediately on the part inflamed, but in its vicinity; the whole phenomena of the disease clearly evincing the presence of an acrid irritant in the blood, and a tendency to escape or pass off by the skin.

SUPPLEMENT.

Having embodied a complete system, in outline, of the Principles and Practice of Medicine, and of the Philosophy of Life and Health, I shall now add, by way of Supplement, some General Rules, founded upon these principles, for the preservation of health, and for the renovation of the system when impaired.

GENERAL RULES, FOUNDED UPON THE PRINCIPLES SET FORTH IN THE FOREGOING PAGES, FOR THE PRESERVATION OF HEALTH, AND FOR RENOVATING AND STRENGTHENING THE SYSTEM.

315. *Attention to the Dictates of Nature.*—THE first of the means to be pursued with the view of preserving health, may, from its importance, be justly designated the cardinal point, and, although so conspicuously important, is the very simple rule, of attending at all times to the dictates of Nature, or the admonitions of the various senses with which we have been gifted for this purpose: for the chief or essential intention of the endowments of hearing, seeing, smelling, taste, and feeling, is, that the body may be directed by their agency, supported in its requirements, and preserved, through their instrumentality, from the numerous dangers with which it is on all sides surrounded;—that sight and hearing, directed by the intuition of Nature (or common sense,) should be the means of our protection from impending

danger, whether it come from behind or from before us, as from the serpent or the thorn which may beset our path, or the advance of the waves, or the mad bull in our rear;—that the sense of smell, presiding over the inlet to our air-passages and lungs, should direct us to avoid air contaminated with any deleterious gas or offensive effluvia of whatever description, as injurious to the system. And again, the sense of taste—situated in the mouth, the other great inlet into the system—acts as a sentinel at the gate, guarding the passage into the stomach against everything in the shape of food and beverage which is ungrateful to the palate, and therefore unwholesome to the body. And next the sense of feeling and of touch—the endowments of the skin—are similar in purpose, and intended to preserve us from the extremes of heat and cold, and from injuries by wound or contusion. To which may be added, as of like import to the system, the sense of hunger and of thirst, the admonitions of which are equally deserving our attention. And lastly, the sense of fatigue, and its opposite condition, excitation of the system, which induce us to repose when required, or to make the exertions necessary for our nutrition and support, and thus fulfil the laws of Nature and the conditions of our existence. These are endowments of the system, one and all of them, common to the whole animal creation, and ordained therefore evidently for our admonition and guidance; speaking intelligibly to all, and directing us to shun whatever is disagreeable to our physical sensibility, as injurious to our organization and nature.

316. Having made these preliminary observations, the subject of which merits at all times our utmost respect—being the laws of Nature and of common sense—I shall now proceed to give a few concise rules, or rather exhibit the principles which should be observed with respect to diet, air, exercise, and the other elements of our existence.

317. *Air; its Purity highly essential.*—With respect to this agent, which is of such vast importance to the animal economy, I must first direct attention to what I have said in the chapter on the Lungs and Skin, which, it will be constantly borne in mind, are not only associated in function, but are in reality continuous surfaces. The purity and temperature of the air are the most important of its qualities, and accordingly are the points of view in which we shall chiefly regard it. The dictates of Nature should invariably be attended to: it should be remembered that the air is preeminently the source of life, and that a portion of every mouthful we inspire will assuredly find its way into the blood. Avoid, therefore, most scrupulously, all offensive smells, and every trace of the air's pollution; such, for instance, as an atmosphere contaminated by the breathing and exhalations from the persons of others, by the products also of combustion, of fermentation or decomposition. Crowded assemblies, the vicinity of burial-grounds, drains, dung-heaps, cellars, the banks of rivers, the abodes of the multitude, and low miry localities, should also be as much as possible avoided. The following extract from Mr. Ritchie's pamphlet on the ventilation of factories, sets forth in a very clear manner the importance of pure air:—"If the various convolutions of the air-cells of the lungs were spread out, they would present a surface thirty times as extensive as the surface of the body; over this extensive surface, through exceedingly minute vessels, the entire blood of the body passes every three minutes; we respire every twenty-four hours a quantity of air that would fill upwards of seventy-eight hogsheads, and the blood passes more than five hundred times in the course of a day through the lungs, exposed to this enormous quantity of air respired. Thus in proportion as impurities exist, the air we breathe becomes a slow or more rapid poison."

318. *Clothing and Temperature.*—And next with respect to temperature. True to the dictates of Nature and common sense is the rule that an agreeable feeling of warmth should at all times be maintained, or, I should perhaps have rather said, a feeling of cold should be avoided; as there can be no question that the most healthy condition is that in which we radiate or give out heat most freely from the system, without experiencing at the same time any sensation of absolute cold; inasmuch as this condition is one of more active production of heat in the system—the demand induced by radiation calling forth and occasioning an increased production, and with this, be it remembered, augmented vital development. It is not, therefore, the sense of warmth nor that of cold, but the happy medium of both, namely, a refreshing and grateful feeling of coolness, which should be aimed at. The temperature of our habitations, and the amount of our bed-covering and clothing, should therefore be in accordance with this rule; making at all times a suitable provision against the emergencies of our variable climate; and adapting such provision to the constitutional powers and occupations of the individual. A delicate person may with propriety be clothed in flannel; but a strong and healthy one is much better without any such covering, at least next the skin. It is a mistake of the day to suppose that mankind in all climates should be encased in flannel; as a proof of which I may mention, that in my own person, after wearing flannel next the skin for more than thirty years, twenty of which were passed in India, I have arrived at the conclusion that it is a debilitating malpractice, and have accordingly transferred the flannel externally to the shirt, wearing it, as occasion may require, for its warmth alone; and this I have done now for two years with great benefit. I derived the hint from the practice of Priessnitz, the founder of the hydropathic system, who it is said inva-

riably makes all who follow his advice throw aside their flannels; and it is unquestionably in evidence, that, with very few exceptions indeed, all have been benefited by adopting this advice. "There are others, again, in the habit of clothing the head during the night with a warm cap: this is a practice, too, strongly objected to by Priessnitz; it weakens the brain (he says) and is highly injurious to persons subject to a flow of blood to the head, headache, colds in the head, &c. There is good sense in the adage, 'Keep the head cool and the feet warm.' In proportion as the body is warmly clothed, and the pure air excluded from the surface, is less warmth produced by the body, and the body becomes chilled. The Scotch highlander with his naked legs does not feel colder, surrounded with the snow-clad mountains, than he whose legs are clothed. Our faces without inconvenience are left bare in the coldest weather." The above extracts from a work on Hydropathy appeared to me to possess so much common sense as to justify me in quoting them.

319. *Flannel and Cold Ablution of the Skin.*—Returning to the subject of wearing flannel constantly next the skin, I repeat that I have derived great benefit from transferring it to the exterior of a cotton shirt. The practice of wearing flannel next the skin, has a tendency to relax the surface and weaken the healthy function of the skin, and, by association, to weaken the functions of the lungs and all the internal organs to which, in their lining membrane, the skin affords a continuous coating. At the time of throwing off the flannel, however, let it be observed, I adopted another of Priessnitz's precepts—if not in the letter absolutely, at least in the spirit of his instructions—namely, cold-sponging the surface on getting out of bed in the morning, a practice which cannot be too strongly recommended. It involves no slopping, as I practise it. After throwing off

the shirt on getting out of bed, a towel should be wrung out in a basin of cold spring water, and the head, chest, and subsequently the whole of the body and the extremities, should be well rubbed down with it; and this should be followed by a good general rubbing of the body with a coarse dry towel, and subsequently with hand-rubbing of the surface. The very delicate may throw a handful of salt into the water, and on commencing the practice, confine the ablution to the chest and abdomen, and progressively extend it to the head, back, and limbs. Those in the habit of wearing flannel, but who do not absolutely require it, I should advise to throw it aside, or transfer it (as I, who am of very delicate constitution, have done) to the exterior of the shirt, as a protection from any sudden transition of temperature.

320. *Advice to those of Costive Habit.*—The surface of the body it is intended by nature should be at all times a radiating one, whereby the heat of the interior organs is constantly flowing towards the skin; by which means a more healthy and active condition of the stomach and bowels is maintained, and thus is the appetite, as everybody knows, increased by exposure to cold air, and, more than this, I can say from experience, the bowels kept free. Before I threw aside my flannel, and adopted the practice of cold ablution in the morning, my bowels required the constant excitement of medicine; but since then, I have not required this assistance. Those who are habitually costive, will do well to follow my example. On returning to bed at night, the body should be again exposed to the air for a few minutes, rubbing it well during the period with a coarse towel, and afterwards with the hands. In the winter season, the very delicate may confine the ablutions to the chest; or a good general rubbing with a pair of Dinneford's horse-hair gloves may be substituted, with an occasional warm bath. In those of robust health, the daily use of the shower or

plunging bath is to be preferred to ablution of the surface; but to the delicate and nervous, the shock which is involved in their use may be objectionable; and unless there is reactive power sufficient in the system to develope a comfortable glow or sensation of warmth after their use, they should in no case be employed. The great object to be attained by either is the establishment of an active and healthy condition of the skin's function, and by consequence, protection from transitions of temperature, and other deranging causes. In so doing, tone and a healthy activity are moreover imparted to the functions of the lungs, and to the stomach and bowels; for their lining mucous membrane is one continued surface with that of the skin—in short, a prolongation of the same, denuded of its outer covering. Now, as everybody must at one time or other, on putting his hand into cold water, have experienced the sense of cold which pervades the skin, and is felt over the body and in the back in particular, he will have no difficulty in conceiving, that by imparting activity and tone to the skin, he may in like manner, by continuity and consent of parts, impart the same to the internal organs also. The skin is a secreting and exhaling surface of vast extent, enveloping all the body and lining all the viscera, and fulfilling, in concert with the lungs, the function of respiration, and with the organs of the abdominal cavity, in addition to that of absorption and secretion, the function of respiration likewise, I believe, for reasons elsewhere assigned.

321. *Great Importance to Health of an Active Condition of the Skin's Function.*—The influence and importance of an active and healthy condition of the skin is, therefore, of first-rate consideration. Assiduous attention to this cannot be too forcibly enjoined, the skin being, if not the mainspring, assuredly one of the most influential of the regulating powers, of the system. The celebrated Boerhaave observes

of the perspiratory function, that the quantity of its secretion exceeds that of all the other exeretions put together; and that its normal active condition demonstrates the most perfect health, of which it is also the principal means of preserving. In support of this, the recent very singular results and important experiments of Messrs. Becquerel and Breschet, of Paris, may be adduced. A rabbit being plastered all over with a material impenetrable to the air, its temperature was reduced from one hundred degrees to eighty-nine before the composition was dry; an hour after, it had cooled down to seventy-six degrees. On another rabbit, prepared with more care, by the time the plaster was dry, the temperature of the animal was so much reduced, that it did not exceed, by six degrees, the temperature of the surrounding air, which was at the time sixty-two degrees; and an hour after this, the animal died. These facts forcibly demonstrate the vast importance of maintaining an active and healthy condition of the skin's function, and explain the success which has unquestionably attended the practice of the hydropathist in imparting tone to the skin's function, of adding strength to the system, in a great number of cases.

322. *Cautions to be observed after Exposure to Cold.*— The secretion eliminated by the skin, in India, is in general acid, and pungently so, as is evinced not only by the taste, but by the fact of its so often discharging the colour of the dress of the ladies, as may be observed about their arms. And this, without doubt, is the healthy condition of an active state of the skin's function; and if so, may well explain how gout, rheumatism, and some other affections, are so often developed by changes in the weather restraining the cutaneous function and this acid excretion from the system. Exposure to a damp or cold state of the atmosphere, or to partial currents of air, is very liable to check, torpify, or arrest this

function, and should therefore be guardedly avoided, as well as all unneeessary exposure to cold. And it must be constantly borne in mind, that after any such exposure, warmth must be gradually and cautiously imparted, or inflammation or fever may become developed, as we see exemplified in the chilblains which succeed to cold in the extremities, or cough and catarrhal affections, which are of like inflammatory character, and are often induced in this way; the cutaneous surface, it will be remembered, extending along the air-passages into the lungs.

323. *Rules of Diet.*—This subject bears reference to the solid constituents of the blood, and to the offices more particularly of the stomach and assimilative organs united in its formation. The fundamental rule to be observed with respect to diet, is moderation in quantity, and simplicity in kind. And assuming that Nature (who has thrown over us the mantle of her protection in so many other contingencies of our nature, and in the endowments of the senses of smell, taste, and appetite, with which we have been gifted, and which are alone sufficient for the guidance of the rest of the animal creation,) has not withheld from us the light of her countenance in so essential an element of our well-being and existence as this, which has for its object the nutrition of the system—I take it for granted, and in so doing am borne out by general observation, that, attention being paid to the simple injunctions given, guided by common sense, (and not mistaking the impulse of bad habits for Nature's indications,) all things are good as food that appetite and inclination may prompt us to desire; excepting such as the observation and experience of the individual prove to be otherwise. Most persons have attained, in some way, a particular idiosyncrasy in this respect; making true the adage, that "what is one man's food is another man's poison"; to which I would add another trite but rational

observation, namely, that "every man should be his own physician at forty;" which, if not strictly true in the letter, is so in its bearing; for that man must be sadly wanting in common sense, or a fool indeed, who, when he has discovered that lobster-salad, pork, fruit, feasting, or excess of any kind, disagrees with him, does not take advantage of his experience and abstain from the same in future, and I may add, relieve his stomach and bowels from the presence of any such offender, when found to disorder him, by some simple remedy, as a tumbler of hot water with a teaspoonful of common salt in it, as an emetic, or a dose of rhubarb, magnesia, or the like, as an aperient.

324. *Importance of attending to the Dictates of Nature.*—I assume, therefore, that Nature, who, in creation, has made man supreme, and the inhabitant of every part of the earth's surface, in her bounty and provident arrangement has not restricted him in the choice of his food, and that all things are good which, when taken in moderation, agree with him. Before concluding this subject, I would again observe, that Nature's indications in all things merit our especial respect and observance. The true physician has been justly styled the "handmaid of Nature;" and so considering him, I can truly aver, that I have often been led, in severe disease and doubtful cases, and in opposition not unfrequently to my own pre-conceived opinion on the subject, to the right line of treatment, by pursuing her indications alone, as manifested by the desires and appetite of the patient; which on all occasions I feel it my duty, therefore, to respect and cautiously indulge.

325. *Moderation Defined.*—Of moderation I shall briefly observe, that it does not imply, as some would define its meaning, leaving the table with an appetite unsatisfied: no, moderation consists in the happy medium between oppression from satiety and its opposite condition of a feeling of

insufficiency; the latter involving, as it would do, loss of weight and debility.

326. *Times of taking Meals.*—From the foregoing and other obvious reasons, it is impossible to define, with any semblance of accuracy, the proper hours for taking meals, as these must in all cases bear reference to the age and constitution of each individual, as well as the circumstances in which he is placed. But the principles which should direct every one, may be clearly defined and readily understood. And first with respect to time: the physiological indications clearly point out, that the hour for taking the principal meal should be in the evening, inasmuch as the energy of the stomach and vital functions may be said to be in antagonism with that of the mental and muscular power; hence the most favourable condition for sleep is that of a full or well-employed stomach, the electro-nervous or actuating power of the system being thereby engaged: hence the drowsiness which is so generally experienced after taking a full meal. And again, for the same reason, the most favourable condition for digestion is that of repose, or abeyance of mental and muscular action, that all power may be employed in digestion. And a further good arising from this arrangement of the dinner hour, is, that we become thus redolent, or rich in juices well concocted during the night for active circulation and support under the duties of the following day. The habit of individuals, and custom, I know, may argue otherwise; but these are fallacious guides. If we are true to Nature, we shall adopt her precepts, and make the evening the time of our principal meal, following the example of the brute creation, who invariably repose after their meals.

327. *Objections to a Late Dinner answered.*—A person habituated to take an early dinner, may often be heard to say that he could not delay his dinner till a late hour. Certainly

not, seeing that he dined early on the previous day, and has necessarily expended all his store of assimilated material. Another observes, that he could not sleep after a late meal: and he is right also, if only a few hours previously he has taken a hearty meal, and this, a second one, without appetite or necessity.

328. *Character of the Dinner.*—The rule is obviously in favour of a late dinner, which should be ample in proportion to the wear and expenditure of the day, and solid, or otherwise in accordance therewith. And although variety as to kind is not prohibited, no incongruity of admixture should be admitted of. Common sense would direct us at one meal to confine ourselves to a good joint of meat, with vegetables and bread in proportion, or a pudding, instead of partaking of a dozen dishes, and these too commonly dissimilar in kind, as we see so thoughtlessly and frequently practised.

329. *Tea and After-meals.*—The evening should be spent without labour or study, and in agreeable amusement; which may be followed up, two or three hours after dinner, with a cup of tea or coffee, as an agreeable diluent and exhilarant, and a biscuit or crust of bread-and-butter before going to bed; or if the hour be late before retiring, a sandwich, or something more substantial, may be necessary to secure the stomach's occupation, and engage any free or unemployed power which might otherwise excite the brain to thought, and prevent sleep.

330. *Character of Breakfast.*—The breakfast should be taken soon after rising in the morning, and be of a character corresponding with the duties to be performed in the day, remembering that mental employ is adverse to much stomach occupation. This may be succeeded by a lunch four or five hours afterwards, and which in like manner should correspond with the feelings and necessities of the individual, consisting of a biscuit with fruit in one case, and a few

sandwiches in another: the quantity, however, should in no case interfere with the appetite and necessities for the dinner, the social meal and hour of enjoyment.

331. *Requirements of the Delicate.*—To these observations I must however add, that the frequency of meals cannot in all cases be limited to the periods named, or to the description of them which I have given. A delicate person, or one advanced in years, proportionate to the feebleness of the general system and corresponding powers of the digestive organs, requires a meal more frequently, less in quantity, and of a lighter description, or of more delicate nature. Such persons may require something every three or four hours, or even oftener: the rule in all cases should be regularity as far as practicable, with a feeling of appetite, or of emptiness should that not be experienced.

332. *Salted Meat,* and indeed salt provisions of all kinds, as well as fat and pork, are unquestionably of more difficult digestion than most other kinds of provisions: they require, therefore, the more active power of the stomach of the labouring classes and the vigorous to assimilate them. Fat is of all substances the most nutritive, but requires abundance of air and exercise for its assimilation and digestion.

333. *Beverage.*—With respect to beverage, from which are derived the fluid constituents of the blood, I must first observe, in addition to what I have already said on the subject, that the natural, the most simple, and wholesome fluid, water, is the only essential and proper beverage for man, as it is for the rest of the animal creation. It requires no decomposition, no digestion; in its simple state it enters immediately into combination with all substances, fat and oil excepted. Beer or wine, and all the other spirituous and exciting beverages in too common use among mankind, are perversions of our social habits and the Almighty's gifts, from

the purposes to which they should be confined—namely, as occasional cordials and renovators of the system under enervation and exhaustion of power, or disease. Although good malt liquor may be allowed to the hard-working man, whose labour often exceeds his electrical productive power, his food being but too frequently of an imperfectly nourishing description, or difficult of digestion, neither beer nor wine (which latter without the nourishment of beer is more exclusively exciting) can be taken with impunity by those whose muscular powers are but little called into exercise, and who at the same time are abundantly fed. Yet many doubtless appear to do so for a length of time without suffering any very sensible inconvenience; but disease, be it remembered, is often protractive and accumulative also; the liver and kidneys, which are brought into too great requisition to excrete or separate all such injurious agents, the latter in particular often becoming diseased, and being a very frequent cause of death without any pain or sensible indication of it during life, except perhaps, that lumbago is experienced occasionally; and in other cases sciatica, or gout—an affection of similar origin—is thus induced.

334. *Pure Water*, I would therefore repeat, is not only the natural but the best beverage that man can use. It may be taken at all times in moderation, according to the degree of thirst and the desires of the individual; and in most cases at the ordinary temperature of the spring from which it is drawn; or as toast-and-water (which should be made by immersing the toasted crust in cold water) to those who give it the preference. Soda water and the like description of beverage now in too common use, should be regarded as medical agents, and not be taken without necessity; the necessity consisting very generally in the abuse of spirituous beverages.

335. *Tea and Coffee.*—The infusion of these grateful ex-

hilarants in boiling water as ordinarily practised, in moderation there is no great objection to, provided they are not taken too hot or too frequently. They should in a general way be confined to the breakfast-table and to persons of adult age. The young require no exeitants of any kind; milk to them is more suitable, abounding as it does in nourishment, which is a quality that neither tea nor coffee possesses. I have observed that tea or eoffee in a general way should be confined to the breakfast-table, though a cup of one or the other may, without any great objection, be taken by most persons in the evening. I mean by this reservation to say, that I believe there are many who would sleep better, and enjoy much better health, were they not to do so. The exeiting qualities of tea upon the nervous system are rendered very apparent by the sleepless nights induced to those unaecustomed to its use in the evening; and coffee in most eases will produee the same effeets. To persons, therefore, who are the subjects of any spasmodie or nervous affeetion, although sleeplessness may not be induced, they are nevertheless clearly prohibited. And to the dyspeptie—another large elass of persons—the sugar and hot water in which they are infused render them equally objeetionable; whereas eold water possesses positively benefieial virtues in sueh eases.

336. *Exercise* is of two kinds—mental and eorporeal. The former bears referenee more particularly to the function of the brain and nervous system, and the latter to that of the museular system. I shall now speak of physieal exercise, or that of the museular system. The condemnation of man was—that "in the sweat of his face he should eat bread all the days of his life, for of the dust of the earth was he formed, and unto dust should he return:" his physieal organization was therefore ordained, doubtless, to fulfil this decree of his Creator. A life of active exertion aceord-

ingly, if not indispensable in all eases to his existence, is certainly the most eonducive to the perfeet and most effieient performanee of his organie funetions, and eonsequently to the health and well-being of his nature ;—an amount of positive good, be it remembered, not limited to his eorporeal functions, the whole man being united in all his parts, but extended to the manifestations of his mind also, which beeomes invigorated in an equal degree, though confined necessarily in its operations, to the extent of its culture.

337. *Exercise divided into Active and Passive.*—With a view to a methodieal consideration of the subjeet of exereise, it is neeessary to consider it in two points of view—in relation to its eharaeter and extent—whether *active* or *passive*. It may be said to be aetive when it is earried to the extent of walking two, three, or more miles, aceording to the age and constitution of the individual, at one time and with earnestness ; or the exereise of some other of the muscles to an equal degree ; or to the extent of producing a more or less perspirable condition of the skin. And passive, when it is eonfined to the usual loitering, or the ordinary exertions of everyday life.

338. *Active Exercise,* to all those who are abundantly fed—or I should rather say (this being the ordinary condition) whose diet borders on excess—for reasons given in a former chapter, is, for the enjoyment of health, indispensable. And on the eontrary, in the ease of those who are scantily fed, exercise should be of a very passive description. For such as are moderately fed, the exercise, in like manner, should be proportionate in degree. Persons amply fed require in general exercise to be earried to the full extent of its indueing a perspirable eondition of the skin, and this continued in a greater or less degree, or for a longer or shorter period, aceording to the amount and deseription of diet employed, and the constitution and state of health of

the individual at the time being. It is obvious that, to maintain a vivid combustion, the fuel in the fire-grate must be proportionate to the quantity of air or oxygen accessible to it: an excess of fuel producing a smothered and smoky fire. And so, in like manner, must the food furnished to the animal machine bear a like proportion to the air inspired; of which we have the means of thus increasing the amount by exercise. And again, as with the fire in the grate, if excess of air be admitted to the fuel, as urged by the bellows, the fuel is soon burnt out, and the fire extinguished, the grate too being perhaps made red-hot, and more or less injured by the process; so, must exercise be limited to the amount of food and sustenance received into the system, and at no time be carried by its nature or force to the extent of inducing great exhaustion or injury of any kind to the animal machine.

339. *Influence of Exercise, and the want of it.*—Exercise of the muscular system increases the action of the heart and respiratory function: and, in consequence of the increased vigour of the circulation, the blood—the pabulum of life—is supplied more abundantly to the remotest parts of the system, and increased action or energy of function is extended to all the organs. Hence, the cause of, and the evils arising from, want or deficiency of exercise, are (in contradistinction to the active joyous feelings of health) inertia, mental and corporeal—characterized by the symptoms more particularly called nervous and dyspeptic—deficiency of appetite, constipated bowels, languid circulation, short or oppressed breathing, muscular lassitude, chilliness, and mental torpor.

340. *Out-door Exercise enjoined.*—With this explanation of the principles upon which exercise operates, and the symptoms more particularly denoting the want of it, the adaptation of exercise to the constitution and circumstances of

each individual may be well left to every man's own common sense and keeping. Whether the exercise be within doors or out of the house, is a consideration merely of temperature, bearing reference to invalids more particularly. Persons in health should not be deterred by the weather, unless it is very bad indeed, from taking that amount of exercise abroad which they find to be necessary. Habituation will soon make all changes of weather harmless to them, as we see exemplified in the labouring classes, who are exposed to its vicissitudes at all seasons. The invalid must of necessity be more cautious; and if a billiard-table is not available to him, exercise may be taken by traversing the room, passages, and staircase, or in the chopping of wood, use of dumb-bells, or the like, or in expanding the chest and exercising the lungs by reciting aloud a poem or other composition, in conversation, or in singing. Riding on horseback, or in a carriage, should bear reference to the strength and to the nature of the ailment of the invalid, and to the capability of the patient's sustaining or being benefited by the excitement of the first, or otherwise. For example, for a person convalescing from an attack of acute inflammation of any kind, or disease of the heart, horse exercise, generally speaking, would be too exciting; but not so when recovering from an attack of gout, rheumatism, or the like. With respect to temperature, it may be briefly observed, that whenever the individual is not capable of the active exercise necessary to maintain a comfortable feeling of warmth in the external air, the exercise should be confined to the house; but in all other cases, unless some especial reason to the contrary exists, or the weather or any other cause forbids, it should be invariably taken abroad in the open air; for change of air, like change of diet, is often of great benefit, and especially so to the invalid.

341. *Time of taking Exercise; and other important*

Remarks.—I shall now make a few observations upon the time of taking exercise. We have all duties of the day of one kind or other to perform ; these, accordingly, the objects of our existence, should be commenced upon immediately or soon after the breakfast meal, whilst the system has an abundant exchequer to draw upon—the accumulated power and product of a night's repose, and the well-concocted juices of the last evening's dinner—to sustain exertion. Four or five hours' mental employ is as much as should be at any one time, and indeed in any one day, devoted to this purpose, or the mind, like the over-stretched bow, may either snap with the exertion, or lose its elasticity. But if necessitated by the circumstances of the individual to do more, it will be much better to continue the labour after a small interval of rest, than to defer it till a later period of the day. The duty of the day, whether mental or corporeal, should be completed before the dinner-time, bearing in mind to reserve for the especial excitement of the stomach an hour's devotion to abstinence from all employ before that meal. After the four or five hours' mental employ, the remainder of the day before dinner should be devoted to exercise, in walking or riding, or muscular exertion of some kind, under the guidance of the rules we have noticed. And when the dinner is completed—which should not be too hastily effected—(every mouthful of food being well masticated, in order that a due proportion of air and saliva may be combined with it before it is swallowed,) the evening should be spent in some agreeable society or amusement. A person whose day has been wholly devoted to mental occupation, after his dinner and an hour's quietude, may very properly engage the remainder of the evening in walking, dancing, billiards, or other not too active exercise. In like manner, the person whose day has been passed in muscular exertion, may more appropriately spend his evening in reading or

mental employ; allowing the mind to rest half an hour or more before going to bed, or retiring whenever sleep is disposed to enfold the system in its soft embrace.

342. *Mental Employ.*—On this subject (a most important one to the health and well-being of every individual) I shall here very briefly observe, that to the successful cultivation of the mind, as well as to the soundness of its manifestations, a healthy state of the body is an essential requirement; and to maintain this, moderation in the mind's employ is as indispensable as muscular exercise and attention to diet. Study, I must add, (by which I mean close application of the mind,) requires perfect abstinence from the excitement of spirituous beverages, together with a full amount of sleep. Besides these precautions, an occasional holiday of some days' complete respite from all mental occupation, with change of air and exercise in the country, cannot very well be omitted. The cultivation of the mind will otherwise be at the expense of health—man's best possession—a superlative good, the exchange for which, no mental attainment, however great, can prove any compensation.—To these scanty remarks I have only to add the request, that the reader will attentively consider what was said on the subject of mental employ in a former chapter.

343. *Sleep and Repose.*—"Tired Nature's sweet restorer, balmy sleep!" An explanation of the phenomena of sleep, and how it is induced ("to die thus living, and thus dead to live") has been given at page 66; to which, in connexion with what I have now to say, I would first direct attention, adding with reference to the time of seeking repose and the amount of sleep required, that the dictates of Nature and common sense are the best counsellors. We see that all the rest of the animal creation are guided instinctively to seek repose when fatigued, and again to rise when refreshed by its influence; and man should do the same when-

ever he feels, from the exhaustion of exercise of any kind, to require it, instead of following the too common practice of swallowing some excitant or other; although doubtless, as a general rule, the hours of darkness, as marked out to us by our provident Creator, should be those exclusively devoted to the full measure of the enjoyment of sleep; and for such period, whatever it may be, as its influence lasts, and until we awake refreshed. Upon an average eight hours for an adult person—the time required by a labouring man—will be a fair proportion. The labourer in general goes to bed at nine at night, and rises at five in the morning—when Nature for a great portion of the year is attired in her most lovely garments—and "the breezy call of incense-breathing morn" appears to invite man to its enjoyment. But the hour of retiring to bed in civil life, provided it be before midnight, experience proves to be of no very great importance, so that the eight hours, or the full period required, be devoted to the purpose. The quantity of sleep absolutely required, it is evident, bears reference to the degree of labour undergone by the individual, and the quantity of exercise taken during the day,—relatively, however, let it be understood, to the exercise of the mental, no less than the muscular energies of the system, and also to the age and constitution of the individual; the infant, with short intervals, being wholly thus engaged, and the delicate and infirm requiring a relatively larger proportion of sleep.

344. *Sleeplessness, how to be remedied.*—As the state of being awake, or alive to all the impressions of the mind and the senses, is one of vital activity, or electrical excitation of the brain—imparted by and derived from the accumulated fund of electro-nervous power, or exchequer of the system; and sleep is the contrary condition, or abeyance of sensorial and mental activity; how all-important must exercise of the muscular system, and expenditure thereby of

electro-nervous power, be to the attainment of sleep! And again, as another mode of expending this power, and thus preventing an overflowing exchequer—swamping the sensorial organs, and exciting the brain to thought, and as a consequence preventing sleep—is the diverting it into a different channel, and engaging it in the stomach's employ, by taking a meal, as I have elsewhere advised, before going to bed. Another expedient which may be resorted to, if a walk or a game of billiards be not available, is reading aloud something of interest, but not of too exciting a character, for an hour or two before going to bed, and thus drawing off into a different channel, and expending, a portion of the electrical stock. Another expedient, which in my own person I have often found successful after undergoing perturbation or too much mental employ, is that of having the hair combed for half an hour before going to bed, or rather, as I have found much more efficacious, getting a young person to pass the fingers through the hair and manipulate the head: this I have found very soothing, and especially so, if done with a cool and rather damp hand; for which purpose the hand, when it is not so, may be occasionally immersed in water, and partially wiped. A portion of the electricity of the system, I am disposed to believe, may be thus withdrawn by the hand of the operator, and hence the excitement of the mind is diminished, and a calm state induced. Or the scalp, insulated as it is by the hair from the air's influence, may by this operation be rendered conductive, and the same result ensue. Moreover, the electricity actuating the mind's organ, and exciting the circulation of the part especially concerned, or more particularly engrossed in thought, is directed by the blandishment of the operation, and diverted into a new channel or different portion of the brain, to the relief of the over-excited part, and sleep succeeds—other conditions being favourable—

that is to say, there being no overflowing exchequer, or surplus fund of exciting power.

345. *Mesmerism.*—In short, is not this the sum and substance of all that is done by the mesmerist, and does not the following afford a full explanation of the hypnotism or somnolency which his operations induce? First, the mind is diverted from more active occupation, and isolated in the passive engagement of attention to the manipulations of the operator; influenced at the same time by the means before adverted to—the fingers and body of the operator affecting the electrical condition of the individual operated upon; and lastly, (though not least in the amount of causes influencing the result,) the condition of the respiration during the period of the mesmeric manipulation; a proportionate quietude of the respiratory movements being an invariable concomitant of the body's quiescence and the mind's abstraction to the manipulations going on. Respiration, being in a great measure a voluntary act, it is obvious, must be so influenced. In like manner is somnolency induced by some simple idea, such as counting an indefinite number, or looking stedfastly at a single object; or mentally repeating a piece of poetry, and thus diminishing respiration, and diverting the mind into a new channel; and that one of only negative influence or of passive excitement.

346. *Possibility of Mesmerism being occasionally useful.*—Should the foregoing explanation of the mesmeric manipulation be considered tenable, it would afford some explanation of the mode in which benefit may have been derived (as it has been said to have been by a person of no less reputation than Dr. Elliotson,) by its operation in epilepsy, chorea, hysteria, and some other cases of spasmodic affection implicating the brain, by diverting and drawing off the exciting stimulus of these organic actions from the portion

of the brain affected, and locating it for the period of the operation, and as long after as the imagination bears upon the subject, in another part of the organ, to the relief of the one affected, independently of the direct benefit which might reasonably be expected from the brain's condition of quietude during the somnolent period, and the transference also of excitement to the abdominal and vital organs, which attends the condition of sleep.

347. But the jugglers' tricks of pretended clairvoyance and phreno-mesmerism, are too ridiculous to merit notice, further than by giving expression to the feelings of indignation and contempt which are naturally excited by such gross attempts at deception.

348. *Sleeplessness, Anxiety of Mind, and Insanity, how to be averted.*—There are other causes of sleeplessness besides those already adverted to; and to these I shall now direct attention. The first I shall mention is one of too frequent occurrence at the present day, namely, perturbation of mind, whether arising from expectation and anxiety, excessive grief, love, or other cause of mental excitement and excess of mental employ. In all which cases, vast is the benefit and great is the comfort afforded by a pill of soft opium, of a grain, or a grain and a half, on going to bed. With some persons sleep follows immediately; but with others it does not take place till some hours afterwards; and such will do well to remember, if it be necessary to repeat the pill, to do so that number of hours before the time of going to bed. If the cause however has been of some duration, and the biliary organs in consequence have become deranged, combining the opium with double the quantity of calomel will add much to its good effects. Many have been impelled by their feelings of wretchedness and anxiety to commit suicide, who never would have allowed the thought of such an act to take possession of their mind

for one moment, had they but experieneed the eonsolation and eomfort of a good night's rest, which might have thus been so easily and eertainly obtained; and there are many others, who are now in the confinement of a lunatic establishment, from anxiety and the influence of eauses of the same eharacter, who never would have beeome insane, had this simple remedy for their grievanees been timely resorted to. With some, the soothing influenee of from ten to fifteen drops of laudanum taken onee or twiee in the day, will fulfil the purpose better than a single dose at night, when the eause of mental disturbanee eontinues in operation. Under extreme bodily fatigue, also, the system may by the same remedy be supported.

349. *Nightmare and Bad Dreams.*—Other eauses of sleeplessness eonsist in the flatulent distension or loading of, or erudities in, the stomaeh and bowels, imparting, without sense of pain, by reflex nervous connexion, excitement to the brain. Bad dreams and nightmare are often thus induced. Or the excitement of the nervous system, and sleeplessness, may be indueed by the retention of the heat of the body by exeess of bed-eovering, or keeping the head too warm. Another cause of sleeplessness is a dry and non-eonducting condition of the skin, when, with a sense of heat, restlessness is experieneed: this may oeeur from the use of wine or too exciting a diet, or from the blood abounding in elements which should have been exereted by the skin or liver, and resulting from torpor or derangement of the functions of these seeretive organs—when a warm bath, or a pill of calomel and aloes, for a few nights, may be required. Having pointed out these several causes of sleeplessness, it is obvious that the removal of the cause is the one and only remedy; in referenee to whieh (and the latter case in partieular) I must refer the reader to the chapter to which eaeh ease respeetively bears referenee.

350. *Wakefulness after a few hours' Sleep.*—Another observation I may be permitted to add for the benefit of some persons, who fall asleep perhaps soon after they get into bed, but wake some two or three hours afterwards, and cannot sleep again. This is a condition which may in general be remedied by getting up and eating a good-sized crust of bread-and-butter, (provided none of the causes of ailment, to which I have previously adverted, exist,)—thus engaging the nervous power in digestion and the nutritive processes—and returning afterwards to a cool bed.

RENOVATION OF HEALTH, AND INVIGORATION OF THE SYSTEM.

351. *Renovation* of the system can imply nothing more than restoration to its pristine condition of health. It is my intention, however, in this chapter to extend the subject to that of invigorating a weakly constitution. Debility of the constitutional powers, derangement of the function or structure of one or more of the organs, or depravity of the blood or derangement in its elementary constituents—one or other of these elements of disease, or all of them, must of necessity be the condition of the system, presupposed to exist, and requiring remedial measures, with the view either to its renovation or its invigoration. Under such circumstances, the first thing to be done is to effect a careful examination of each organ, both in its individual capacity and in its relative connexion.

352. *Examination of the Organs.*—Beginning with the stomach, as the central organ of the body—Is it affected with pain or uneasiness? Is the appetite indifferent or capricious? and is the stomach liable to flatulent distension?

If either of these symptoms exist, and especially if it be conjoined with constipated bowels, torpor of the liver is most probably the immediate cause; and attention to this is the chief indication to be held in view. For the mode of treatment of this disorder, I must refer the reader to the previous chapter on that subject, attention in all cases being at the same time paid to air, exercise, diet, and the means already enumerated for preserving the health. Should continued nausea or sickness of stomach exist, aggravated by taking food, or by pressure over the affected organ, a congestive or subacute inflammatory condition of it probably exists, requiring in this case bleeding, local or general, aided by mercurials, with the view of unloading the vessels of the stomach, which are connected with those of the liver, and increasing the secretion of bile and the circulation through that organ. Symptoms of an analogous description may, however, be dependent upon atony or debility of the organ, as a sequel of the undue excitement of spirituous beverages. In this case, if of short duration, bitters and ammonia are the remedies, and abstaining from the offending cause in future; but if of longer duration, congestion will have taken place, and the treatment must be the same as in the former case. If again the bowels, instead of being constipated, are habitually relaxed, a plethoric or congestive condition of the veins of the bowels is most probably the cause, consequent either upon there being more blood in the system than the heart is capable of freely circulating, or upon some impediment to its passage through the liver. In the first case bloodletting is required; and in the second, the exhibition of calomel, in relief of any such obstruction.

353. *Bleeding and other Evacuations generally curative efforts of the System.*—The evacuations I have spoken of in the last case are evidently curative efforts of the system, and so are the formation and the bleeding of piles, which more

frequently attend the opposite condition of eonstipation; and the latter, when habitual, is very generally based upon a plethoric or engorged state of the liver, impeding its function; or if not, upon a hardened state of that organ, induced by the habitual use of wine and spirituous beverages. Obstruction of the liver is, however, an abundant source of derangement, giving rise to a multitude of symptoms; the veins of the bowels, neck of the bladder, and womb, being all in connexion, and associated likewise in nervous power. From which causes in after-life, when the powers become enfeebled, and the constitution and habits of the individual altered—the male leading a less active life, and the female system being not relieved as it used to be after the manner of the sex, and blood in eonsequence accumulating in the system—and by means of the congestion which in these cases takes place in the liver—the several organs in connexion with it become engorged, and disease of the neck of the bladder or prostate gland (or stricture) takes place in the male; and in the female, congestion of the neck of the womb, and leucorrhœal discharge ensues; or enlargement and disease of the womb or ovaries (appendages of the womb) take place. In other cases, enlargement of the liver or spleen, and dropsy, follow. Or, from the accumulation of fat, which is now often abundantly formed in relief of the system, the descent of the midrif and the expansion of the lungs are obstructed, and asthma succeeds—if apoplexy or palsy does not occur. Now the simple explanation afforded of the cause and true character of these various affections, conspicuously points out that the treatment is the same in character in all these cases, modified only by the nature of the organ affected and the stage of the affection: the inflammation of the part which very generally succeeds to the congestion, not unfrequently however produces effects which survive their original cause. But the early treatment is alike in all these cases, and

consists in general of bleeding, in relief of the system, followed up by local bleeding from the anus or the immediate vicinity of the part affected, conjoined with calomel, diuretics, and aperients, and a more abstinent diet, with early rising, air and exercise, and the frequent ablution with cold water of the part affected.

354. *Importance of attending to apparently trifling Derangements of Health.*—The kidneys next merit our attention. Is pain experienced in the loins? If it be, it behoves us carefully to examine the urine. What are its appearance, its specific gravity, and quantity voided in twenty-four hours? Is the desire to evacuate it preternaturally frequent? and is its expulsion attended with a sense of scalding, or pain of any kind? These are all questions especially deserving attention, disease of the kidneys being a much more frequent affection than is generally supposed; and it may exist without pain for years, without the individual being at all alive to the fact, and to the danger of his condition. The subjects of Lumbago or Sciatica will do well to consider this, and remember that pain of the kind is much more frequently the concomitant of disorder of the kidneys, than rheumatic or muscular, as it is so frequently thought to be.

355. *Treatment of Pain, and the Premonitions of Disease in the Organs of the Chest and those of the Abdominal Cavity.*—Should continued pain exist in any organ or part of the abdomen, and especially if the pain be increased by pressure on the part, or on making a full inspiration, an inflammatory condition of the part so affected may be inferred, and bleeding, local or general, be indispensable to its relief, conjoined with evacuants and an abstinent diet. The same remark holds equally good with respect to the chest: should pain be experienced in any part of it, attended or not with cough, or shortness of breath, or difficulty of breathing, or sense of the girth of a ligature between the chest and ab-

domen, bleeding will very generally be required. Many who cannot venture abroad in the winter season from cough and cold, which invariably follow such exposure, may thus by bleeding remove the congestive fulness of the lungs, and be relieved from the necessity for this confinement.

356. *Premonitory Symptoms of Apoplexy, &c.*—Lastly, with respect to the Head; should pain, with sense of fulness, and confined bowels, or drowsiness by day, giddiness, or deafness, or chronically inflamed or bloodshot eyes, be experienced; or cataract, impaired vision, defect of memory, or impaired articulation; these symptoms are all dependent on congestion of the blood-vessels of the brain, and are often the precursors of palsy or apoplexy. In all of these cases it is obvious that bleeding and evacuants are the proper remedies: but these will be required necessarily over and over again, unless the individual can be induced to practise more self-denial, take more exercise, and improve his general habits.

357. *Objections to Bloodletting answered.*—In professional practice it is the constant reply of the patient to our advice that he should lose blood in these cases—"No, I cannot lose blood, or I must be constantly repeating it!" "Certainly you will," I say, "provided you continue to eat and drink and take as little exercise as you lately have done; how can it be otherwise, if necessity now exists for bleeding, and you continue the practice which gave rise to the production of this surplus quantity of blood? The necessity in future has nothing to do with the bleeding, but with your continuing the cause of it." Another will reply, "I am already so weak, that I require blood being put into my veins rather than withdrawing any from me." And yet such a person, if thrown from a horse or knocked down in the carriage-way, would not hesitate a moment in allowing himself to be bled immediately in anticipation of an

evil which may never exist; yet, with disease now in operation, he refuses to submit to it! because he feels weak, which necessarily must be the case from disorder of the functions and the unhealthy condition of the system.

358. *Loss of Life how commonly the result of neglect.*—I mention these cases, which are of daily occurrence, merely to show how little common sense is exercised in these matters, and how profoundly ignorant the multitude are on subjects which above all others should afford them the greatest interest. Thus we hear daily of one person falling down dead in the street, and another paying the debt of nature after only a few days' illness. Who can be surprised at such occurrences, seeing that so little is known of these matters, and less done for their prevention? For disease, I maintain, with very few exceptions indeed, is accumulative in the system, and would seldom occur if people would attend to the premonitory stage and the deviations of health, of some kind or other, which invariably precede absolute sickness. But no, this most useful knowledge and precautionary practice, as long as the individual can stir a leg, or swallow food, is wholly neglected; and the consequence but too frequently is, that the sexton is called in soon after the doctor. Whereas with proper care and attention, I believe life might be preserved to a much more extended period than it now is, seeing how numerous are the conservative powers in operation in the system, and the available means we possess both to cure and to prevent disease.

359. *Disease of the Heart.*—I have yet said nothing concerning the Heart. If pain in its region exist, with oppression of the circulation, bleeding must necessarily be had recourse to; but more than this I shall here say nothing, as the numerous ailments both of function and structure to which it is liable, are, with very few exceptions, secondary in character or subordinate to some other disease, if they are

not directly developed by nervous derangement or mental excitement, in the way I have pointed out in the chapter on this subject.

360. I have now completed a hasty and superficial glance at the more immediate and frequent affections of the principal organs, and the symptoms which characterise them; and would refer the reader for more particular information on each subject to the chapter in which such subject has been treated on.

361. *The newly-formed Blood; the Pabulum of Life and Nutrition.*—I shall now, in conclusion of this part of my subject, add such remarks as I have to offer, upon the remaining very important subject of the Blood's condition and depravity, annexing some observations on nutrition in connexion with the subject. First, I maintain, that the elements of the blood (constituting the pabulum of life) or such as are essential to the building up and nutrition of the system, as well as those of combustion and vitalization, are those of diurnal accession—*the newly-formed blood!* I do not believe in the constant building-up and pulling-down system of Liebig and others; by which the human system is supposed to be in a perpetual state of mutation and renovation; and by which, it is said, changes essential to the blood's qualifications are effected. I believe in nothing so opposed to that simplicity and economy which reign throughout all Nature's operations. Fat (an inorganised substance—the product of nutrition surplus to the immediate necessities of the system—a deposition in the cellular structure, like honey in the comb,) is no doubt stored up one day, and is absorbed and again enters the circulation on another, whenever the requirements of the system exceed the immediate supply furnished by the stomach; and thus it is, that persons lose their weight and become thin by illness and starvation, and regain their weight so soon as these causes are removed. I do not deny that in *starvation*,

after the expenditure of the fat, the tissues will be consumed: but this is an extreme case, an effort to maintain life when no other resource is available. But the fibrous structure and solid textures of the system remain, as in the case of the fibre of the oak, a permanent structure; and the brain of today, an organised fibrous structure, is in like manner the brain of tomorrow also; and thus is the individuality of the character maintained; else, the instability of a man's mind would be constant. In illustration of this, let us now trace the operation of Nature's simple laws in the process of nutrition, and in the development of the chick, from a few primary elements constituting the egg, which will leave no question as to the fact I wish to establish; namely, that the newly-formed blood is the true pabulum of life—a fact very important in the consequences I wish to found upon it, in relation both to the renovation of the system and to the cure of disease.

362. *The Incubation of the Egg, and simple Constitution of the Blood.*—The chick, developed by the incubation of the egg, under the vivifying influence of the parent's temperature of body, is formed and fashioned in a few days out of the few elementary materials of its blood, which becomes first formed out of the simple albumen, or white of the egg in combination with the air of the atmosphere which has access to its surface. The yolk which subsequently enters the system consists of albumen also, with some oil and sulphur, adding also to the qualities of the blood, but fulfilling the purposes I believe more particularly of combustion in the advanced stage of its development, when its temperature is much augmented and vitality increased. The animal in the short period of twenty-one days is perfect in all its parts, and, redolent of life and heat, now quits its shell, and becomes an independent creature; though wholly constituted, and thus fashioned out of a few simple elements which enter into the composition, or principally so, of albumen, (which

is composed of carbon in the proportion of 56 parts in 100, with 7 of hydrogen, 15 of nitrogen, and 22 of oxygen,) in combination with, and otherwise changed by the influence of, the air of the atmosphere—a compound of oxygen and nitrogen; which, under the influence of the heat of the parent's body, enters into combination with the albumen, and first converts it into blood, as the microscope clearly demonstrates.

363. *The Nitrogen of the Air an essential Element of the Blood and Animal Nutrition.*—The independent creature, the newly-formed animal, now daily increases both in size and weight, feeding upon grain alone—oats or barley—the principal constituent of which is starch, which is composed of 45 per cent. of carbon, with 6 of hydrogen, and 49 of oxygen. Now these being the constituent elements of albumen, and flesh and blood wanting the *nitrogen* which these animal productions all contain in the proportion of 15 per cent., this element it is obvious must be derived from the atmosphere, of which it constitutes 80 per cent. From which it is apparent that the purpose of breathing is not only the inhalation of oxygen, in maintenance of the combustion which ensues upon it, but nutrition also, in the conversion of the vegetable into animal substance; and thus the use of four fifths of the atmosphere is now regarded as of little purpose otherwise than as a diluent to the remaining one fifth of oxygen; the proportions being 20 of this to 80 of nitrogen.

364. *Purity and Freshness of the Blood essential to Health.*—We come now to the conclusion—the result to be derived from the foregoing facts. It is clear, that as air and starch were the only materials furnished to the animal, which both grows and lives by their agency, the reception of these, or their elements, into the system, with a view to their union in certain definite proportions, (producing albumen and blood, and developing in the process heat and electri-

city, or vital action,) is the primary and fundamental process of life—which one and all of the functions of the system are subordinate to and dependent upon. It is clear, also, that healthy nutrition, and renovation also, must depend, principally or very largely, upon keeping the fountain clear, or, in plain language, the blood pure and fresh; the newly-formed blood furnishing in all cases, as we have exemplified in the development and growth of the chick, all the results of vital manifestation and nutrition.

365. *Over animalization and impurity of the Blood, the cause of decrepitude and disease.*—The purity of this stream has doubtless been provided for in a great degree by the agency of the purifying organs of the body—which in the excretions of the liver, kidneys, and skin, fulfil these purposes; but I maintain, nevertheless, that in the multitude of things we receive into the circulation as constituents of our food and beverage, certain elements or particles often do find their way into the blood—useless or objectionable in kind—which are not thus eliminated; and that others in process of time may, by excess of animalization, disorder of some function, or other means, be also thus formed, and, as recrementitious matter, accumulate and pollute the blood; and further, as objectionable and useless matter, occupying the vessels, prevent the accession and introduction of new matter to the blood, and thereby become the cause of decrepitude and the infirmities of age, or, in other cases, premature debility and decay.

366. *Renovating influence of Bloodletting.*—If what I have said is correct, we have, in the renewal of the stream by bloodletting—which not only removes the bad, but facilitates the entrance of the good and fresh materials, (absorption both of air and of nutriment being increased in proportion as the vessels are emptied,) a most valuable agent of renovation of the system, and one which, if judiciously employed, bids fair, I am of opinion, to relieve, if not to

restore to perfect health, a large proportion of the decrepid and incurable which are everywhere to be found. But it will be argued that bleeding is an unnatural practice. Before I reply to this objection, I shall adduce another reason or two for its adoption. In the former part of this work I have endeavoured to establish the principle—that the essence of every disease consists intrinsically either in congestion of the blood-vessels, or in inflammation, or in the intermediate condition, or that of *irritation;* which principle, the various organic affections which I adduced must, I think, most satisfactorily confirm. And further, it is a fact, with very few exceptions indeed, that whenever death takes place it is in consequence of the existence of one or other of those conditions of the blood-vessels, or the effects they have occasioned. Now with these facts before us, and the universally acknowledged success which attends bloodletting in inflammatory and congestive diseases, who can doubt of its being employed with great advantage with the intentions I have pointed out, which are not limited to the prevention of those affections of the blood-vessels, but extend also to their cure.

367. *Bleeding not an unnatural Practice; far otherwise.*—In reply to the objection, that bleeding is an unnatural practice, I maintain that it is not so, seeing the relief afforded monthly to the female system, by a process of an analogous kind; and women in the best health are those in general with whom the relief is most plentiful. And how critical the period, and how liable to disease they are, when it ceases to be thus with them! And again, the bleeding of the nose in youth, and in after life from the fundament by piles, are in both cases curative efforts of the system, and should always be so considered; and in proof of this, and the harmlessness of piles, I may mention a few facts not undeserving of notice.

368. *Facts in proof of the utility and harmlessness of Bloodletting.*—When in India, and in charge of a battalion of artillery, I observed that the inmates of the hospital were limited at all times to a certain number of the men, the rest enjoying a comparative immunity from disease. Now as they all fared alike in duty, in diet, and in every other particular, I thought that the cause of the exemption from disease on the part of so many was worthy of investigation. With this view I had the men paraded for inspection, when I found, to my astonishment, that those exempted from disease were, with very few exceptions, the subjects of bleeding piles. This afforded at once a satisfactory explanation of their exemption from disease—while the cure of the men frequenting the hospital constantly required the use of the lancet; and in many cases of acute disease, to the extent not unfrequently of four or five pounds or more! Inflammation of the bowels or liver, if not arrested within a few days of the attack, terminates very generally in mortification or abscess; and thus arises the great mortality which prevails in India. From these diseases the men affected with piles, and under proper discipline, were exempted. And for reasons of like character women in general enjoy better health than men do in India.

369. *The newly-formed Blood the source of Life and Nutrition.*—As another very striking instance in support of the harmless nature of bloodletting in moderation, and of the immunity which it often affords from disease, I shall mention the case of a distinguished officer of the Indian cavalry with whom I was acquainted, who appeared always in health, and was as full of fun and frolic as the youngest cornet of the regiment. Residing at his house for a few days, I could nor help expressing to him my astonishment at the hearty meals he always made, and wonder how he could manage to enjoy health, and take his couple of bottles

of beer every day. His reply was remarkably apt; "You will agree with me, Doctor, that a large expenditure requires a handsome income for its support. Well then, I never go to a certain place, (which I do most regularly every morning,) that I do not pass half a pint of blood, having been the subject of bleeding piles for years!" This explained the matter: and taking the loss of blood he sustained at a fourth part of what he said, as people are generally apt to be deceived in respect to the quantity of blood they lose, it confirmed in my mind, what experience had long before taught me, that life and health are dependent more upon the elements of diurnal *accession* to the blood (and hence the prostration which succeeds the want of a meal to those in health) than upon those of the older portions of the vital stream, and that bloodletting in consequence, when practised with discretion, is not only a very harmless, but, with truth may I add, a very useful practice,—seeing that no natural outlet exists for the grosser and richer particles of the blood, when these become in excess, as I believe they frequently do.

370. *Renovating Influence of Air, Exercise, &c., conjoined with Bloodletting.*—I have said that bleeding, if judiciously practised, may be advantageously employed, that is, in small quantity and at short intervals, in order that no direct debility may be produced by the operation—and continuing it, in conjunction with suitable diet, air, exercise, and such other remedies and appliances (the hydropathic among the number) as the circumstances of the patient may especially call for in the renovation of his system. This leads me, in completion of the subject of renovation, to add a few remarks upon the practice of the Hydropathist, which, although condemned by many, possesses, in my humble opinion, much to commend, and much also that is in the highest degree valuable and deserving of adoption.

371. *The Principles and Practice of Hydropathy.*—The practice of this system comprises, in my opinion, two distinct and dissimilar intentions; and as they are both available to the purposes of renovation, I shall describe them in detail, in order that the method of pursuing them may be clearly understood, and the especial object to be attained by each be distinctly comprehended. The objects to be fulfilled in one case, are—the blood's purification, and the reduction of any preternatural excitement of the system, or part of it. The other intention is, that of exciting and giving tone to the cutaneous function, and by consent of parts and continuity of surface, invigorating the function of the lungs and the abdominal organs, and in short, the entire system. The first of these intentions is fulfilled by increasing the secretions of the skin and the kidneys. For this purpose the patient is directed to rise early and take plenty of air and exercise, and drink throughout the day an abundance of pure water, abstaining at the same time from exciting beverages of all kind, and paying, also, great attention to his diet. In addition to these injunctions, which are truly valuable, if judiciously carried into effect, the patient is daily subjected to a simple, powerful, and excellent process of sweating. For this purpose, he is first enveloped in a sheet made wet by immersion in cold water (and afterwards wrung out), and then getting into bed, is covered and tucked up in some half-dozen of blankets or more. Sweat, being thus induced, is maintained by the patient's remaining quiet and thus covered for four or five hours; drinking from time to time during the period half a tumbler of cold water with which he is supplied, and breathing the fresh air—the window of the room being kept open if the season admits of it. The sweating process is at length terminated by the patient's being removed to a bath, in which being seated, cold water is poured over him; which is done with the intention of restoring tone to the skin and

of obviating the relaxing effect of the previous process. If a bath is not available, the application of wet cloths to the surface is substituted.

372. *Hydropathy in Gout, Rheumatism, &c. a useful practice.*—This practice of eliminating the morbific matter by perspiration, conjoined with that of fulfilling the same purpose by increasing the urinary secretion, (by drinking plentifully of cold water), must without doubt be an admirable method of treating gout, rheumatism, scrofula, and many cutaneous and other affections, dependent upon the presence of the salts of the urine and other depravities, as well as an inflammatory condition of the blood. In addition to these means, in relief of any local affection, a wet bandage protected from evaporation by a covering of some folds of a dry one surrounding it, is applied to the part affected, and which is thus kept in a damp state as it would be by a poultice, the same being renewed occasionally.

373. *Hydropathy in general Debility, Dyspepsia, &c., a useful practice.*—The second intention of the hydropathist, which is more particularly applicable to cases of general debility—and that large class of them in particular known as nervous and dyspeptic, based upon our too luxurious habits of life, ceaseless anxiety, and excess of mental employ, added to insufficiency of exercise—is, as I before mentioned, effected through the cutaneous surface and consent of parts, giving tone to the system in general. It is thus practised: the patient rising at dawn of day is immediately plunged from his warm bed into a cold bath, in which he remains for a couple of minutes; on emerging from this he is well rubbed dry, and when dressed he starts upon a walk of a couple of hours or more; from which, drinking two or three tumblerfuls of cold water upon the road, he returns to his breakfast. Soon after this is completed, he starts upon a second walk; and after this practice has been pursued for a short time,

and he has gained a little strength, he is exposed in the open air and subjected to a douche-bath,—or column of water of a few inches in diameter, falling from the height of twenty feet, or more, upon his head and body—from which, after dressing, he again proceeds on his walk, and returns to an early dinner. After resting awhile he proceeds again to walk, and is probably subjected to a third bath—sitting, in this case, for an hour, perhaps, in cold water immersed up to his hips—from which, after spending his evening in amusement and taking supper, he retires early to rest, to fulfil the same routine on the following day; and which he continues two or three months, or more, till his strength is fully established.

374. *The Systems of the Trainer and the Hydropathist compared.*—This, I think, will be acknowledged to be a fair representation of the practice of Preissnitz, the author of the Hydropathic system; and although open to some objections it assuredly embodies principles, which if judiciously carried out, are of most useful application in the treatment, not only of the large class of affections previously adverted to, but many others also; inasmuch as it in an eminent degree developes and augments all the natural powers of the system —and these are the only curative means in any case. The hydropathic practice, it will be well to observe, embodies in it the system of the trainer, by which the bloated, ill-conditioned, short-winded sot, we know, may in a few weeks be changed to the firm-fleshed, healthy-skinned, long-winded, and courageous prize-fighter; which effects are in this case produced principally by increasing and developing the breathing powers by means of air and exercise, and thus burning out all the blood's grossness and impurities, adding at the same time to the muscular development and powers of the system; in short, doing that for the man, which might in like manner be done for the bloated pig—take him from his sty and

make him, like the sheep, roam the hills in search of his food; and there, by the expansion of his lungs and the increased quantity of air imbibed into the system under active exercise, not only burn out by the absorption of an increased quantity of oxygen a portion of the surplus carbon and hydrogen (the elements of fat) which abound in his case, but convert into muscle or flesh other portions of the same, by adding elements thereto, and combining therewith, nitrogen—the other constituent of the atmosphere, as in the case of the sheep feeding on the mountain range;—the sheep in the same manner as the chick, as before explained, thus converting starch or the elements of its composition, which it derives from its food, into its substance.

375. *The system of Preissnitz not limited to the use of Cold Water.*—The system of Preissnitz, I am however bound to say, does more than this, as it includes, in addition to active exercise in the open air, the mind's repose, by abstaining from all active mental employ; with abstinence also from all warm fluids and exciting beverages, a plain wholesome diet of meat, bread, vegetables, fruit, and cold water, only being allowed, with early rising, and early return to bed; and last, though not least in amount of beneficial consequences, preserving the blood from contamination and further deterioration, by excluding physic altogether! or when the blood is so contaminated, or by other cause deteriorated, as we have previously spoken of as being the case in gout and many other affections, purifying and divesting it thereof, by washing out the impurity with cold water, and expelling it from the system through the agency of the skin and the kidneys.

376. *Preissnitz highly deserving Commendation.*—This system, I must avow in conclusion, embodying as it assuredly does, if not all the requirements of a complete system of treating disease, yet including so many pre-eminently

useful principles, deserves most undoubtedly great commendation; and it is not only puerile, but discreditable, to say in disparagement of its author, although but a peasant, that he has taught nothing that was not known before; inasmuch as it is not what may be learnt, but what is practised by man, that constitutes desert.

377. *Hydropathy may be practised at Home.*—In saying as much as I have done in favour of the system of Preissnitz, I am not supporting quackery; but, by giving my reader some very useful information, simply fulfilling an act of common honesty towards its author; awarding praise to him to whom, in my estimation, praise is so justly due. Nor am I for advising an invalid to take a long journey into the far country of Silesia, nor directing him to proceed on the shorter one to any of the numerous hydropathic establishments which now abound in this country; having, by fully unfolding to him the hydropathic system, both in principle and practice, put him in possession of all the knowledge requisite to enable him to carry out all its essential requirements in the precincts of his own habitation: not that I approve its indiscriminate adoption even in the particular cases mentioned, as in cases of extreme debility with deficiency of reactive power, or in plethoric conditions of the system, it would be highly objectionable.

378. *Utility of Cold Water as a Beverage.*—I have further to add, that believing as I now do, for reasons given elsewhere, that the circulation through the liver and the excitement of the lacteal or nutritive absorbent vessels, are effected through the instrumentality of the oxygen which, as a constituent of the air, is absorbed from the surface of the stomach and bowels; and as cold water contains a large amount of atmospheric air—sufficient, indeed, to maintain the vitality of fish and other aquatic animals whose gills are exposed to its influence (and which air is expelled by boiling)—

it speaks to every man's common sense, that cold water partaken of as the common beverage in exclusion of all such as have been boiled, and others (like soda-water, ginger-beer, and the like) containing carbonic acid, or spirituous and exciting qualities, must be an agent of much value, in all cases of torpor of the liver or stomach and bowels,—independently of the direct tonic influence of the cold fluid on the stomach, and associated organs, if used in moderation.

In conclusion of this subject, I have only to add,—that although I deprecate the too prevalent practice of swallowing physic, and thus contaminating the vital stream, upon every trifling feeling of disorder—when in the majority of instances a day's abstinence or a little more air and exercise would effect all that is necessary; yet, as of two evils the least is to be chosen, so it is better to take a timely dose than suffer derangements to progress in the system, and complications of disease to ensue. And as the operation of all deranging causes is to depreciate the functions and active energies of the system, or disorder the secretions, and especially that of the liver; as a general remedy, adapted to meet most cases, the following pill will be found an extremely useful domestic remedy; quite as efficient, more convenient, and much to be preferred to the usual doses of pill and black draught, or other domestic medicine. This remedy is composed of twenty grains of calomel, with the same quantity of soccotrine aloes and Castille soap, made into twelve pills; of which one may be taken at night when necessary, or at other time if needed. A single dose may be all that is required on ordinary occasions of confined bowels or other derangement, or it may be repeated once or oftener as the circumstances of the case may require; and although it may not be equal to the cure of every disease that may occur, it will do what is better, if timely resorted to, in

conjunction with abstinence and general attention,—and that is, it will in most cases either prevent any such occurrence taking place at all, or prepare the way for more specific treatment.

Having at length brought my work to a conclusion, I may be permitted to observe, that although it is not so complete as I could have desired, being indeed myself but a *cripple* on the road, I nevertheless trust that I have taken the lead in the right direction; and although it does not fulfil half my own expectations, (for who ever wrote a book without feeling on completing it that he might have done better,) yet I hope it will be found to embody much useful knowledge, and a multitude of *suggestions* by which the science of medicine may be improved, and life and health prolonged.

THE END.

LONDON:

PRINTED BY G. J. PALMER, SAVOY STREET, STRAND.

